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Abstract

By making detailed observations of the entire classroom process and by administering relevant tests and indices to teachers and students, this 2-year study attempted to determine what factors affect educational effectiveness. The theoretical basis was that the ways to achieve the varied goals of education (knowledge of subject matter and development of all aspects of the individual) are compatible. The study had two phases. In the major phase, the causes of student progress were sought by relating such progress to measures of classroom process and to measures of a teacher's personality and behavior. In the minor phase, the effects of sensitivity training for teachers were measured in a classic control-experimental group procedure. The subjects were the teachers and students in 57 classrooms, grades 3 through 6, in four metropolitan elementary schools. Pretesting, posttesting, personality measures and observations of classroom process were extensive and detailed. Results of the minor phase are not clear, but tend to support previous findings that effectiveness of sensitivity training tends to correlate highly with the teacher's level of psychic resources. Results of the major phase in general support the theory of compatibility of the varied goals of education. Benefits of sensitivity training can be measured, although not everyone is benefited. (MH)

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AN INTEGRATIVE APPROACH TO CLASSROOM LEARNING

Robert S. Soar

Temple University
Philadelphia, Pennsylvania

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Robert S. Soar
August 29, 1966 Temple University

Table of Contents

Page

List of Tables viii
List of Figures xvi

Chapter

1 An Overview of the Project. 1

Introduction 1
The Goals of Education and Effective Teaching . . 1
Identifying Effective Teaching 3
Sensitivity Training and Effective Teaching. . . 6

Outline of the Project 7

2 Review of the Literature 9

Introduction 9

The Goals of Education and Effective Teaching . . . 9
Education and Mental Health 9
Education and Creativity 12
Education and Motivation 15
Education and Group Skils. 16
An Integrative View of Classroom Learning . . . 17

Past Research in Identifying Teacher Effectiveness. . 20
Methodological Problems 20
Defining a Criterion -- the Difficulty of ratings 20
The Jump from Teacher Characteristics to Pupil Change 21
Infrequent Use of Product Measures 22
The "All Else Equal" Assumption 23
Problems of Measurement and Analysis . . . 24
Studies Relating Observed Classroom Process to Pupil Change 25
Studies Using Flanders' Interaction Analysis. 27
Studies Using Other Observation Systems . . 30
Sensitivity Training and Effective Teaching 39

Summary. 42

3 Procedure 43

Statement of the Problem 43

Design of the Project 43

Table of Contents (Continued)

Chapter Page

Subjects 46

Measures 48
    Presage Measures 48
        The Minnesota Multiphasic Personality Inventory (MMPI) 48
            Special Keys 49
                Anxiety. 49
                Repression. 49
                Ego Strength 49
                Hostility and Pharisaic Virtue . . . 50
            Research Relating the MMPI to Teacher Effectiveness. 50
            Factor Analytic Studies of the MMPI . . 54
        Other Measures . . . .
    Process Measures 54
        Flanders' Interaction Analysis. 54
            The I/D Ratio. 58
            I/D Ratio in Response to Pupils. . . . 58
            Vicious Circle 59
            Drill Activities. 59
        South Carolina Observation Record (SCOR) . . 59
        Schedule of Observations. 64
    Product Measures 65
        Iowa Tests of Basic Skills (ITBS). 65
        Children's Manifest Anxiety Scale (CMAS) . . 65
        The Dependence-Proneness Scale (D-P). . . . 66
        The Minnesota Tests of Creative Thinking . . 67
        Pupil Survey (Survey). 68
        My Class 70
        Russell Sage Social Relations Test (RSSR) . . 71

Sensitivity Training 74
    Rationale of the Training Laboratory 74
        Understanding 74
        Skills. 74
        Sensitivity 75
    Procedures Used in the Training 76
        Theory Session 76
        Training (T) Group. 76
        Skill Practice 77
    Training of the School Principals 77

Analysis of Data 78
    Product Data 79
        Measures of Pupil Change. 79
        Need for Measures of Change. 79

Table of Contents (Continued)

Chapter Page

Problems in Measuring Change 80
Procedure for Measuring Change. 81
Measures of Pupil Status 83
Process Data 83
Initial Screening. 83
Calculation of Factor Scores 83
Relations Between Process and Product Measures. . . 85
Theoretical Analysis. 85
Empirical Analyses 87
Correlation of Process Factor Scores with Classroom Product Means 87
Relation of Process and Product Measures over Two Years 87
Factor Analysis of Process and Product Measures 89
The Relation of Presage Measures to Process and Product Measures of Teacher Effectiveness. 90
Evaluation of Sensitivity Training for the Teachers 90

Summary 93

4 Results and Discussion 94

Product Measures 94
Means and Standard Deviations 94
First Year Correlations 104
Intercorrelations of Fall Measures 104
Intercorrelations Fall to Spring. 117
Intercorrelations of Spring Measures 117
Second Year Correlations 118
Intercorrelations of Spring Measures 118
Summary of Product Measures 118
Reduction of Product Measures 131

Process Measures 131
Reduction of South Carolina Observation Record Measures 131
First Factor Analysis of Process Data. 134
Second Factor Analysis of Process Data 138
Summary of Process Measure Reduction 145

Relations Between Process and Product Measure 145
Analyses of Climate and Control in Relation to Pupil Growth 145
Analysis of Pupil Growth During the Year . . . 145
Summary of Learning During the Year . . . 157
Analysis of Pupil Change During the Summer . . 158

Table of Contents (Continued)

Chapter Page

Analysis of Pupil Change During the Summer . . 158
Influence of Classroom Process on Summer Learning 159
Individual Differences in Summer Gain 170
Summary of Summer Gain 175
Relation of Process Factor Scores to Product Means . 176
Correlation Study of Process Factor Scores With Total Class Product Means 176
Summary Discussion of Total Class Results . . 185
Correlation Analysis of Process Factor Scores with Subgroup Means 191
Differences in Correlations Between the Sexes . 192
Differences in Correlations for Subgroups Differing in Anxiety Level 193
Differences in Correlations for Subgroups Differing in L 206
Differences in Correlation for Subgroups Differing in Dependence-Proneness 213
Summary of Subgroup Correlations 220
Analysis of Mean Growth Over Two Years 221
Factor 1, Teacher Criticism 222
Factor 3, Extended Discourse (vs. Rapid Teacher-Pupil Interchange) 229
Factor 6, Pupil Hostility (vs. Teacher Support and Pupil Interest) 235
Factor 8, Indirect Teaching (vs. Silence and Confusion 241
Summary of Mean Growth Over Two Years. . . . 247
Process and Product Measures Factor Analyzed Together 248
Factor Score Stability. 256

Relation of Presage to Process and Product Measures . . 259
Relation of Presage Measures to Process-Product Factor Scores 259
Relation of Presage Measures to Classroom Product Means 262
Summary Discussion of Presage Measure Results. . . 267

Evaluation of Sensitivity Training. 267
Results of the Analyses 268
Factor 1, Creativity Growth vs. Pupil Physical Freedom. 268
Factor 4, Indirect Teaching vs. Dependence-Proneness 273
Factor 7, Interest and Learning vs. Pupil Hostility 273
Factor 11, Achievement Gain 273

Table of Contents (Continued)

Chapter Page

Summary Discussion of Sensitivity Training Results. . 286

5 Summary, Conclusions, and Implications 289

The Problem 289

Outline of the Project 289
Design 289
Subjects. 291
Analysis of the Data. 291

Results and Discussion 292
Product Data 292
Process Data 292
Relations Between Process and Product Measures . . . 292
Analysis of Climate and Control 293
Summer Gain 293
Correlation of Factor Scores with Class Means. . 294
Study of Gain Over Two Years 295
Presage Measures 296
Evaluation of Sensitivity Training 297

Implications. 298

References 301

Appendix A. 311

List of Tables

Table | Page

1. Constants Used in Weighting Subscores of Minnesota Test of Creativity 69

2. Means and Standard Deviations for Product Measures for Third Grade Pupils for the First Project Year 95

3. Means and Standard Deviations for Product Measures for Fourth Grade Pupils for the First Project Year 96

4. Means and Standard Deviations for Product Measures for Fifth Grade Pupils for the First Project Year 97

5. Means and Standard Deviations for Product Measures for Sixth Grade Pupils for the First Project Year 98

6. Means and Standard Deviations for Product Measures for Third Grade Pupils for the Second Project Year 100

7. Means and Standard Deviations for Product Measures for Fourth Grade Pupils for the Second Project Year 101

8. Means and Standard Deviations for Product Measures for Fifth Grade Pupils for the Second Project Year 102

9. Means and Standard Deviations for Product Measures for Sixth Grade Pupils for the Second Project Year 103

10. Correlations Between Product Measures for Third Grade Pupils for the First Project Year 105

11. Correlations Between Product Measures for Fourth Grade Pupils for the First Project Year 108

12. Correlations Between Product Measures for Fifth Grade Pupils for the First Project Year 111

13. Correlations Between Product Measures for Sixth Grade Pupils for the First Project Year 114

14. Correlations Between Product Measures for Third Grade Pupils for the Second Project Year 119

15. Correlations Between Product Measures for Fourth Grade Pupils for the Second Project Year 122

List of Tables (Continued)

Table Page

16. Correlations Between Product Measures for Fifth Grade Pupils for the Second Project Year 125

17. Correlations Between Product Measures for Sixth Grade Pupils for the Second Project Year 128

18. Reliabilities and Intercorrelations Over Two Years for Items from the South Carolina Observation Record . . . 133

19. Rotated Factor Loadings for Two Observation Schedules for 55 Elementary Classrooms (First Analysis) 137

20. Rotated Factor Loadings for Two Observation Schedules for 55 Elementary Classrooms (Second Analysis) 142

21. Stability of Process Factor Scores Over Two Years 144

22. Analysis of Variance for Vocabulary Residual True Gain Scores for Sixteen Elementary Classrooms 147

23. Analysis of Variance for Reading Residual True Gain Scores for Sixteen Elementary Classrooms 148

24. Analysis of Variance for Non-Verbal Creativity True Gain Scores in Sixteen Elementary Classrooms 152

25. Analysis of Variance for Product Improvement True Gain Scores in Sixteen Elementary Classrooms 153

26. Analysis of Variance for Unusual True Gain Scores in Sixteen Elementary Classrooms 154

27. Analysis of Variance for Vocabulary Summer Growth for Two Classroom Behavior Dimensions 160

28. Analysis of Variance for Reading Summer Growth for Two Classroom Behavior Dimensions 162

29. Weighted Means Analysis of Variance for Arithmetic Concepts Summer Growth for Two Behavior Dimensions . . 164

30. Weighted Means Analysis of Variance for Arithmetic Problems Summer Growth for Two Behavior Dimensions . . 165

List of Tables (Continued)

Table Page

31. Longitudinal Results for Two Years of Growth for 189 Pupils 167

32. Residual True Gain for Three Periods of Growth for 189 Pupils 168

33. Correlations of Vocabulary and Reading Residual True Gain for Three Time Periods 172

34. Correlations of Arithmetic Concepts and Problems Residual True Gain for Three Time Periods 173

35. Correlations of Factor Scores for Classroom Process and Mean Pupil Change 177

36. Comparison of Three Studies on Selected Measures of Flanders' Interaction Analysis 189

37. Correlations Between Classroom Process Factor Scores and Classroom Means for Girls for the First Project Year . 194

38. Correlations Between Classroom Process Factor Scores and Classroom Means for Boys for the First Project Year . . 197

39. Correlations Between Process Factor Scores and Classroom Means for Low Anxious Group for the First Project Year 200

40. Correlations Between Classroom Process Factor Scores and Classroom Means for High Anxious Group for the First Project Year 203

41. Correlations Between Classroom Process Factor Scores and Classroom Means for Low L Group for the First Project Year 207

42. Correlations Between Classroom Process Factor Scores and Classroom Means for High L Group for the First Project Year 210

43. Correlations Between Classroom Process Factor Scores and Classroom Means for Low Dependence-Prone Group for the First Project Year 214

List of Tables (Continued)

Table Page

44. Correlations Between Classroom Process Factor Scores and Classroom Means for High Dependence-Prone Group for the First Project Year 217

45. Analysis of Variance of Pupil Change Over Two Years in Vocabulary in Classrooms Differing in Factor 1, Teacher Criticism 223

46. Analysis of Variance of Pupil Change Over Two Years in Arithmetic Concepts in Classrooms Differing in Factor 1, Teacher Criticism 224

47. Analysis of Variance of Pupil Change Over Two Years in Product Improvement in Classrooms Differing in Factor 1, Teacher Criticism 225

48. Analysis of Variance of Pupil Change Over Two Years in Anxiety in Classrooms Differing in Factor 1, Teacher Criticism 226

49. Analysis of Variance of Pupil Change Over Two Years in CMAS: L in Classrooms Differing in Factor 1, Teacher Criticism 227

50. Analysis of Variance of Pupil Change Over Two Years in Vocabulary in Classrooms Differing in Factor 3, Extended Discourse (vs. Rapid Teacher-Pupil Interchange) 230

51. Analysis of Variance of Pupil Change Over Two Years in Arithmetic Concepts in Classrooms Differing in Factor 3, Extended Discourse (vs. Rapid Teacher-Pupil Interchange) 231

52. Analysis of Variance of Pupil Change Over Two Years in Product Improvement in Classrooms Differing in Factor 3, Extended Discourse (vs. Rapid Teacher-Pupil Interchange) 232

53. Analysis of Variance of Pupil Change Over Two Years in Anxiety in Classrooms Differing in Factor 3, Extended Discourse (vs. Rapid Teacher-Pupil Interchange) 233

List of Tables (Continued)

Table Page

54. Analysis of Variance of Pupil Change Over Two Years in CMAS: L in Classrooms Differing in Factor 3, Extended Discourse (vs. Rapid Teacher-Pupil Interchange) 234

55. Analysis of Variance of Pupil Change Over Two Years in Vocabulary in Classrooms Differing in Factor 6, Pupil Hostility (vs. Teacher Support and Pupil Interest) 236

56. Analysis of Variance of Pupil Change Over Two Years in Arithmetic Concepts in Classrooms Differing in Factor 6, Pupil Hostility (vs. Teacher Support and Pupil Interest) 237

57. Analysis of Variance of Pupil Change Over Two Years in Product Improvement in Classrooms Differing in Factor 6, Pupil Hostility (vs. Rapid Teacher-Pupil Interchange) 238

58. Analysis of Variance of Pupil Change Over Two Years in Anxiety in Classrooms Differing in Factor 6, Pupil Hostility (vs. Teacher Support and Pupil Interest) . . 239

59. Analysis of Variance of Pupil Change Over Two Years in CMAS: L in Classrooms Differing in Factor 6, Pupil Hostility (vs. Teacher Support and Pupil Interest) . . 240

60. Analysis of Variance of Pupil Change Over Two Years in Vocabulary in Classrooms Differing in Factor 8, Indirect Teaching (vs. Silence and Confusion) 242

61. Analysis of Variance of Pupil Change Over Two Years in Arithmetic Concepts in Classrooms Differing in Factor 8, Indirect Teaching (vs. Silence and Confusion) 243

62. Analysis of Variance of Pupil Change Over Two Years in Product Improvement in Classrooms Differing in Factor 8, Indirect Teaching (vs. Silence and Confusion) 244

63. Analysis of Variance of Pupil Change Over Two Years in Anxiety in Classrooms Differing in Factor 8, Indirect Teaching (vs. Silence and Confusion) 245

List of Tables (Continued)

Table Page

64. Analysis of Variance of Pupil Change Over Two Years in CMAS: L in Classrooms Differing in Factor 8, Indirect Teaching (vs. Silence and Confusion) 246

65. Stability of Process-Product Factor Scores Over Two Years 257

66. Relation of Teacher Presage Measures to Process-Product Factor Scores 260

67. Relation of Teacher Presage Measures to Classroom Means 263

68. Analysis of Variance for Teacher Residual Change in Factor 1, Creativity Growth vs Pupil Physical Freedom, in Relation to MMPI Pd 269

69. Analysis of Variance for Teacher Residual Change in Factor 1, Creativity Growth vs Pupil Physical Freedom, in Relation to MMPI Sc 270

70. Analysis of Variance for Teacher Residual Change in Factor 1, Creativity Growth vs Pupil Physical Freedom, in Relation to MMPI R 271

71. Analysis of Variance for Teacher Residual Change in Factorl, Creativity Growth vs Pupil Physical Freedom, in Relation to MMPI Pt 272

72. Analysis of Variance for Teacher Residual Change in Factor 4, Indirect Teaching vs Dependence-Proneness, in Relation to MMPI Pd 274

73. Analysis of Variance for Teacher Residual Change in Factor 4, Indirect Teaching vs Dependence-Proneness, in Relation to MMPI Sc 275

74. Analysis of Variance for Teacher Residual Change in Factor 4, Indirect Teaching vs Dependence-Proneness, in Relation to MMPI R 276

75. Analysis of Variance for Teacher Residual Change in Factor 4, Indirect Teaching vs Dependence-Proneness, in Relation to MMPI Pt 277

List of Tables (Continued)

Table Page

76. Analysis of Variance for Teacher Residual Change in Factor 7, Interest and Learning vs Pupil Hostility, in Relation to MMPI Pd 278

77. Analysis of Variance for Teacher Residual Change in Factor 7, Interest and Learning vs Pupil Hostility, in Relation to MMPI Sc 279

78. Analysis of Variance for Teacher Residual Change in Factor 7, Interest and Learning vs Pupil Hostility, in Relation to MMPI R 280

79. Analysis of Variance for Teacher Residual Change in Factor 7, Interest and Learning vs Pupil Hostility, in Relation to MMPI Pt 281

80. Analysis of Variance for Teacher Residual Change in Factor 11, Achievement Gain, in Relation to MMPI Pd . . 282

81. Analysis of Variance for Teacher Residual Change in Factor 11, Achievement Gain, in Relation to MMPI Sc . . 283

82. Analysis of Variance for Teacher Residual Change in Factor 11, Achievement Gain, in Relation to MMPI R . . 284

83. Analysis of Variance for Teacher Residual Change in Factor 11, Achievement Gain, in Relation to MMPI Pt . . 285

84. Means and Standard Deviations of Classroom Means by Sex for the First Project Year 312

85. Means and Standard Deviations of Classroom Means for Low and High Anxious Groups for the First Project Year . . 313

86. Means and Standard Deviations of Classroom Means for Low and High L Groups for the First Project Year 314

87. Means and Standard Deviations of Classroom Means for Low and High Dependence Prone Groups for the First Project Year 315

88. Means and Standard Deviations for Classroom Process Factor Scores for the First Project Year 316

List of Tables (Continued)

Table Page

89. Correlations Between Process Factor Scores for the First Project Year 317

90. Correlations Between 40 Classroom Observation Measures and 17 Classroom Means for Subject Matter, Personality, Creativity, Attitude and Group Skill 318

91. Rotated Factor Loadings for Process and Product Measures 326

List of Figures

Figure Page

1. Summary of Categories for Interaction Analysis 56

2. Sample Interaction Matrix 57

3. South Carolina Observation Record 60

4. Process Measures Used in the First Factor Analysis . . . 135

5. Process Measures Used in the Second Factor Analysis . . . 140

Chapter 1

An Overview of the Project

Introduction

The Goals of Education and Effective Teaching

The goals which American education has accepted have expanded over the years. From an initial concern with the development of knowledge and intellectual skills in pupils, educators have broadened their view of the responsibilities which the school should assume to include those of emotional and social growth as well -- actualizing the breadth of human potential. Along with this broadened view of the goals of education has come a greatly expanded picture of the kinds of skills and competencies which a teacher ought to have in order to be effective in the classroom. Today's teacher is presumed to be competent in fostering growth in such diverse aspects of the child as mental health, creativity, curiosity, social adjustment, democratic problem solving, responsibility, wholesome attitudes towards society, community, school, and peers, and in cultivating the interest and ability of the pupil to further his own learning. In addition to all these, the elementary teacher is expected to be competent in a variety of subject matters ranging from reading, writing and arithmetic to art and music. This is a very imposing picture of the competencies expected of the elementary teacher.

However, these goals which have been assumed gradually by the school have recently met considerable criticism. The assumption which the critics make is that the schools are failing to teach "fundamentals" while accepting responsibility for these other aspects of pupil growth. There is agitation for a return to the "fundamentals" or a more classical education.

But instead of merely seeking a return to earlier procedures, if the varied goals of education are examined and prescriptions sought for ways in which each of these goals can be reached, a surprising degree of similarity emerges. In this literature, the teacher is encouraged to give pupils a voice in decision making, to help them examine their own experience in order to learn from it, and to utilize the motivational and skill-building possibilities inherent in small, autonomous work groups. Perhaps prior to all of these is the establishment of a warm, supportive emotional climate as a basic requirement for growth in all these skills. Considerable segments of both personality and educational theory suggest that what is required of the teacher is that she enlist the normal healthy growth processes of the child in the teaching-learning function (or at least not block them!). Both personality and educational theory suggest that many ideas about behavior and learning might be viewed in these basic terms.

A basic thesis of this research, then, is that aside from teacher subject matter competence, it is possible to identify and measure a common core of teacher-pupil classroom behaviors which are basic to most, if not all,of these aspects of pupil intellectual, personal, and social growth. If this is true, then there should be no conflict between the advocates of classical education and those who have concern for teaching the whole child because the goals of both are met simultaneously. Thus, effective teaching would require development of these core skills rather than expertness in a large variety of unique skills; and might be more reasonably attainable.

Identifying Effective Teaching

It is apparent in the preceding paragraphs that the basic problem underlying all of the discussion is that of identifying the nature of effective teaching in relationship to different sets of goals of education. In attempting to deal with this problem, the research here described makes a series of procedural assumptions about why past research has not produced answers to the question.

One of these difficulties has been the frequency with which the criterion of effective teaching in past research has consisted of a set of ratings -- typically made by administrators or supervisors. The most consistent finding in this literature is that when these ratings have been compared with change in pupils, no relationships have been found. This suggests that what is needed are more objective, more refined, and yet more comprehensive measures of teacher-pupil behavior in the classroom, rather than ratings of it.

Another difficulty appears to be the design of the typical research of the past which has looked, on the one hand, at teacher characteristics such as amount of professional training, intelligence, or grades in college, and on the other hand, at change in pupils. The difficulty here is that when characteristics are found which do relate to pupil change, their interpretation remains in doubt because there is no information about what went on in the classroom -- the intervening activity.

This in turn relates to a series of other difficulties, one of which is that measures of change in pupils have only infrequently been taken as criteria of the effectiveness of the educational process (and even less often has a measure other than achievement been studied). In most instances, judgments of the nature of effective teaching have served in their place, even though it is clear that the judgments do not relate to pupil change. Another related difficulty has been that the typical study, in not examining classroom process, has assumed that it would be similar from teacher to teacher in all respects not under study. Otherwise, it would make no sense to study differences in teacher characteristics and to assume that their relationship to pupil change was a function only of differences in teacher characteristics. On the other hand, it would seem reasonable to assume that differences in teacher characteristics might produce differences in a variety of aspects of classroom behavior, which in turn might be related to changes in pupils. For example, assume that differences in pupil learning are to be compared for two groups of teachers, one well prepared in the subject matter, the other less well prepared. Is it reasonable to expect that the classroom behavior of the two groups will be similar except for ability to deal with subject matter? Or is it likely that differences in emotional climate, in use of small groups, in freedom afforded pupils, for example, would also occur? And, if so, might some of these differences be the effective variables rather than, or in interaction with, the differences in teacher preparation?

Similarly, differences in pupils have rarely been studied in relationship to classroom process, and the assumption has typically been made that effective teaching for one pupil will be effective teaching for all pupils.

All of these shortcomings in past research have probably been functions of the difficulty of measuring many aspects of classroom process and many aspects of change in pupils, and the impossibility of dealing with large numbers of measures so as to sort out the relationships and the interactions among them.

Only recently have these difficulties been overcome, in part at least. New systems for observing teacher-pupil behavior in the classroom appear to capture important aspects of classroom process. An increasing variety of measures of pupil characteristics have appeared in recent years. Finally, the availability of computers for data processing has made analysis of such complex data possible.

A part of the rationale of this study is that the use of these newly available resources will enable more effective approaches to identifying teacher behaviors that are related to change in pupils; and that numbers of teacher characteristics, such as measures of personality, intellectual level, training and experience, can be related to the complex of classroom process and pupil change.

The broad purpose of the research was to attempt to identify the teacher skills associated with growth in a wide variety of aspects of the pupil. A basic assumption was that it would be necessary to measure a wide variety of behaviors in the classroom, both teacher and pupil, from which those core behaviors could be identified which facilitated pupil growth, and that this could only be accomplished through complex statistical analysis.

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A contrary point of view about the nature of good research holds that "clean," "theory-based" research tests relationships between a limited number of measures posited by theory as important. But the long history of negative results in studies of teacher effectiveness suggests that theory may not yet be able to identify the crucial variables; and if this is true, then the screening of large numbers of possibly important variables appears to be a worthwhile approach.

Perhaps the position of the researcher on teacher effectiveness is analagous to the prospector seeking gold, in that his theory is specific enough to identify more likely places to dig, but not specific enough to pinpoint the location of the nuggets. And if this is true, we should expect that it would be necessary to sift considerable amounts of gravel in order to find occasional flecks of gold.

Sensitivity Training and Effective Teaching

Along with the idea that patterns of teacher-pupil behavior can be identified that are central to effective pupil learning of a variety of sorts, was an idea of what at least a part of this core pattern might include. It was hypothesized that classrooms in which the most effective pupil learning took place would be ones in which the teacher shared with pupils the responsibility for planning and directing the work of the classroom, and for maintaining control over classroom behavior while this work was proceeding.

There is reason to believe that sensitivity training is an effective procedure for developing the skills of teaching in this fashion. A second thesis of this research is, then, that not only will there be found a common core of teacher-pupil behaviors which are basic to a number of kinds of learning, but that an essential ingredient in this common core will be effective group interaction and that this skill can be taught. A part of the project, then, is sensitivity training for a subgroup of the teachers, and assessment of the effect of this training.

Outline of the Project

This research stems from the view that theory and past research in education suggest that the ways to achieve the goals which education has assumed are compatible. From the elements in common, a constellation or core can be identified which will be related to pupil growth in a number of areas. This constellation, in turn, should be related to teacher characteristics. A further part of the thinking underlying the project is the expectation that a part of this constellation can be taught by means of sensitivity training for classroom teachers.

In line with this rationale, then, the general sequence of the project was as follows: a series of measures of the status of elementary school pupils were administered in the fall and in the spring of the first year, and again in the spring of the following year. These measures were chosen to represent as many different aspects of growth in pupils as could be measured reasonably objectively. Included were measures of subject matter achievement, both primarily verbal and primarily quantitative, measures of creativity, of personality, and a situational test of cooperative group problem solving. In addition, measures of perception of and attitude toward the classroom and of motivation were administered at the end of each of these years.

During the middle months of each year, teacher-pupil classroom behavior was observed using two different observation schedules.

This sequence of testing enabled the assessment of change in the pupils during each of these years which could be related to the observations of classroom process for each year.

In addition, sensitivity training was provided for a sub-group of the teachers the summer between the two project years, so that the effect of training these teachers could be assessed by comparing classroom process and pupil change for the trained and the untrained groups over the two years in a pretest-posttest, experimental-control group design.

Finally, measures of teacher personality and other characteristics were collected the first project year, so that these teacher characteristics could be related to composites of teacher-pupil behavior and pupil change.

Chapter 2

Review of the Literature

Introduction

In line with the overview of the project presented in Chapter 1, this chapter will review publications relevant to each of the topics discussed there. These represent the major concerns of the study -- the goals of education and the relation of effective teaching to them; past research on identifying effective teaching; and research on the usefulness of sensitivity training for classroom teachers.

The Goals of Education and Effective Teaching

Education and Mental Health

Both educators and mental health specialists have been concerned with the relation between education and mental health, and although there are minor differences in point of view, the similarities are much greater than the differences. From the field of mental health, for example, Stevenson (1956) says:

> ...mental health and education are so inseparable as often to be considered one and the same. Mental-hygienists, including educators, are concerned with this one objective -- to develop the potentialities of the child for meeting life's situations satisfactorily. (p.237-8)

In the same general vein, Smith (1961) says:

> In so far as we take the requirements of education seriously, then, we cannot help trying to grapple with conceptions of optimal human functioning. (p.301)

Representative of a point of view of educators, Biber (1955) has commented that there is a common thread running through the concern about what schools ought to be and how they should be different -- a concern for recognizing emotional factors in the development of children as being as important as their cognitive development. This is a problem the schools cannot avoid because children go to school; it is inevitable that teachers will influence developing personalities; and there must be concern for the nature of this influence on the developing personality. She comments: "Every school room for which this holds is something of a mental health movement in itself." (p. 159)

Rivlin (1955), another educator, has commented that today's teacher is as concerned as ever for teaching subject matter, and indeed has responsibility for teaching much more subject matter than the teacher of a generation ago; but today's teacher is equally concerned with assuring that his pupils are well enough adjusted to be able to use the information they have acquired. "He knows that _how_ the children learn is as important as _what_ they learn." (p. 14)

Numerous attempts to define mental health can be found in the literature; one of the more extensive is that of Jahoda (1958); a more recent one, and one basic to the rationale of this study, is that of Smith (1961). While Smith deals with the problem of defining mental health, his primary point is that the attempt to define it is a will-o-the-wisp not likely to be attained. He sees the attempts to define mental health, and the listing of various criteria which are to be a part of that definition, as largely useless; and suggests instead that the title "mental health" be taken simply as a rubric or chapter heading under which fall a variety of evaluative concerns. He argues that if this point of view is taken, then there need be little argument about what particular topics are taken up in that chapter, or the limits of the list of mental health attributes. He suggests instead that attempts to arrive at _the_ list be given up, and that research proceed with relating the numbers of whatever list is chosen to each other and to other factors in the history and environment of the person.

He does, however, suggest several criteria which may be useful in deciding on the members of any list. They are as follows: (1) they ought to be important, although it is clear that consensus is too much to expect; (2) they ought to be behavioral, or immediately inferable from behavior; (3) it will be helpful if they have some relation to personality theory, although it is also clear that personality theory is in need of further development; (4) they should be relevant for the social context which is being considered. In the area of education, for example, the relevant question would be: "What sort of psychological assets would we like the schools to develop in our children?"

Smith's point of view will be taken here in dealing with the relationship between education and mental health. Many, if not all, of the goals of education could also be accepted as members of a list of defining criteria of positive mental health. At the global level, education is concerned with the optimal functioning of the individual, and as a part of this optimal functioning, with the development of intellectual knowledge and understanding. This fits in with Stevenson's view of realizing potentialities for meeting life's problems as basic to mental health, for subject matter learning is basic to adult performance in the home, on the job, and in the community. In addition, achievement has been shown to bear an immediate relationship to other measures of mental health, and is an effective basis for mental health screening as shown by Bower, Tashnovian and Larson (1958) and Stringer (1959). The fact that learning difficulties, especially in reading, are frequently associated with adjustment problems of one sort or another supports this view.

Ryan (1956), in writing about the relation of mental health to education, comments: "Repeatedly in the recent literature a similarity appears between goals set by mental hygienists and by educators even when there seems to have been no particular collaboration...." (p. 418). As an example, Rivlin (1955) has commented to the effect that concern for the personal and social development of the child -- for mental health -- is not a plea for soft pedagogy. Indeed, he comments that there is ample experience "to demonstrate that children learn better and accomplish more under conditions which foster mental health." (p. 16).

Thus, many goals which educators have accepted as goals of education might reasonably be accepted as aspects of good mental health -- good social relationships, harmonious working relations, efficiency in learning, "wholesome" attitudes, creativity, curiosity, and responsibility. In the simplest terms, good mental health, broadly conceived, is not only a goal of education, but a means to other goals, if indeed they are separable at all.

Education and Creativity

There has recently been emphasis on the measurement of creativity and the conditions which foster it, because these are aspects of child development of vital concern to education and the nation. The descriptions of conditions which are expected to foster growth in creativity bear considerable resemblance to those prescribed as ideal for both subject matter achievement and good mental health.

Rogers' description (1954) may serve as an example. He described the fostering conditions as two-fold: psychological safety and psychological freedom. Psychological safety has several aspects, including empathic understanding, acceptance of the individual as a person of unconditional worth, and a climate free of external evaluation. Reaction to the person's behavior (rather than to him), which still permits him to retain his own locus of evaluation, is not only seen as accepting, but may, in itself, be freeing. The effects of psychological safety are seen as lessening needs for rigidity and defensiveness, fostering openness to experience, and "...freeing (the) real self to emerge and express itself in varied and novel formings as it relates itself to the world. This is a basic fostering of creativity." (p. 255). Torrance (1961) supports this view of safety as a requirement of classroom creativity.

Rogers' second major condition, psychological freedom, is based on freedom of symbolic expression, but also involves permissiveness. However, the permissiveness with which he is concerned is freedom with responsibility. It is clear that, for him, this sort of responsible freedom is the climate within which an internal locus of evaluation may be developed which is basic to constructive creativity. (p. 258).

The parallel of creativity with mental health prescriptions and those of a modern philosophy of education will be clear. Maslow (1959), as another example, explicity identifies creativity as a correlate of mental health. Torrance (1961) supports this view from one study, and indirectly from others.

On the other hand, there is occasional doubt expressed that creativity is necessarily a correlate of good adjustment. The opinion is expressed that the bizarre productions of the severely maladjusted would be high in originality as it is usually scored, and further, (Hilgard, 1959) that numbers of highly creative individuals have shown evidence of immaturity or maladjustment -- Goethe, Copernicus, Newton, Darwin, Van Gogh, Degas, Byron and others.

Although there has been little empirical research on the relationship between creativity and mental health, the bulk of the theorizing appears to argue in favor of a positive relationship between the two, at least sufficiently to warrant testing.

There is also research which relates creativity to achievement in such a way as to suggest that considerable overlap exists here, too. The work of Getzels and Jackson (1958) is well known and has been replicated by Torrance (n.d.) who verified the findings with a number of other groups. These studies agree in indicating that there is a considerable relationship between creativity and academic achievement, with intelligence held constant, and that this relationship is highest for the kinds of achievement which a contemporary educational philosophy values most -- "creative applications of knowledge, decision making, and self-initiated learning...." (Torrance, n. d.).

McNemar (1964) has reviewed this literature in his usual caustic fashion and concluded that the IQ still reigns supreme. But much of his review is concerned with setting up a straw man (that creativity measures have been proposed as a substitute for intelligence measures as predictions of academic achievement) and demolishing it. But even his review, critical as it is, supports the idea that creativity measures capture additional, unique, valid variance.

Still more recent research results (Edwards and Tyler, 1965; and Ohnmacht, 1966) failed to find the expected relationships between achievement and creativity. Torrance's work, however, indicated that the degree of relationship depended partially on the extent to which creative learning was accepted and rewarded by the school system under study.

In the light of these divergent findings, it seems important to study the relation of classroom process to both kinds of educational outcomes in the hope of clarifying the issue.

Education and Motivation

Burton (1958) has summarized the implications of theory and research in relation to the motivation of the pupil in the classroom. These agree on the superiority of intrinsic motivation to extrinsic motivation, and argue strongly for the importance of maximizing self-initiated learning experiences on the part of pupils. As an aside, it is interesting to note that Torrance (1961) identifies this kind of self-initiated learning as characteristic of the highly creative child, but points out that he often gets into trouble in the classroom because of his divergent activities.

The undesirable consequences of motivation induced by competitiveness and rivalry, and the more wholesome effects of motivation brought about by cooperative activities and by participation are stressed. The clearest empirical demonstrations of the superiority of participative methods in building motivation come from the industrial setting (Coch and French, 1948; Maier, 1952) but there is also evidence that the same principles apply to children (Lippitt and White, 1947). Miel (1952) has detailed the procedures as well as the pitfalls of teacher-pupil planning.

These sources taken together suggest that participation in planning is effective in increasing motivation, and make clear that the attitudes and values involved are very similar to those which have been outlined in the mental health and creativity descriptions. Central again are respect for the individual, freedom of expression, a sharing of responsibility with the group by the leader, and the importance of a supportive emotional climate.

Education and Group Skills

Group activities are useful as a means of increasing motivation by participation, as well as increasing ways of capitalizing on intrinsic motivations for learning already present in the classroom by diversifying activities through the use of small groups. In addition to these, the skills of effective group membership are themselves learning outcomes generally accepted as desirable in our society. It is to this end that much of the attention to group activities in the classroom has been directed, supported further by an awareness that a great part of the work of the world is accomplished by small groups. This is particularly true of coordination and policy-making on important questions in education, industry and government.

In addition to the immediate skills of working with one's peers, these learnings are seen as elements of responsible citizenship, learned in the microcosm of the classroom. Again, the recommended classroom procedures are similar to those cited above -- an opportunity for pupils to gain skill in making decisions by actually making them, freedom of expression, respect for the individual, sharing of responsibility, a supportive atmosphere, and the possibility of learning to increase effectiveness by examining one's own behavior (learning by experience).

In summary, these examples illustrate the common elements in the descriptions of teacher procedures which are intended to maximize pupil growth in subject matter, mental health, creativity, motivation and group skills.

It is clear that each of these descriptions of the kind of classroom which ought to achieve the desired educational goal is implicitly a definition of teacher effectiveness. Very simply, the effective teacher is one who is able to create the classroom conditions described.

An Integrative View of Classroom Learning

The overlap between these educational goals and the means described by which they may be reached served as the starting point for this project, and suggested the desirability of looking for a small number of more basic dimensions underlying the various characterizations of classroom behavior. At a pragmatic level, the attempt to identify such dimensions, if successful, should help to clarify the nature of teacher effectiveness; but at a more abstract level, it is conceivable that a relatively small number of critically important dimensions of the teaching-learning process might emerge, and that relations between them and pupil growth might clarify the dynamics of classroom interaction and learning. As an example, the literature which has been reviewed indicates considerable overlap between the conditions for fostering growth in the areas of subject matter learning, mental health (broadly conceived), and creativity. (Other learnings also fit this constellation, as has been indicated, but consideration will be restricted to these three for the moment.) Stringer (1959) found that slope in an academic progress chart was a satisfactory screening procedure for mental health, and Bowers, Tashnovian and Larson (1958) found achievement standing to be similarly effective. Getzels and Jackson (1958) and Torrance (n.d.) have found creativity to be largely unrelated to IQ, but to be a good predictor of academic achievement. The conditions thought to foster growth in all three are similar. The hypothesis proposed here is that anxiety (or tension level, or perceived stress), which narrows perception and reduces response variability, is a mediating variable underlying creativity, mental health, and academic achievement; and perhaps, by extension, complex coping behavior in general.

Considerable research has been done on the relation between anxiety and laboratory learning tasks. Castaneda, Palermo, and McCandless (1956), using the Children's Manifest Anxiety Scale, identified groups of children high and low in anxiety and administered complex learning tasks differing in difficulty to the two groups. They found that the high anxious group learned easy tasks more rapidly than low anxious, but low anxious learned difficult tasks more rapidly.

than the high anxious.

Runkle (1959) in a review of this area concluded that the results of numbers of studies are clear in indicating the interaction of anxiety and difficulty level in learning, and that the optimal level of anxiety is higher for simple tasks than complex, but that all tasks showed decrement with higher levels of anxiety.

Flanders, Anderson, and Amidon (1960) demonstrated that more "dependent prone" (anxious?) pupils achieved differentially with differences in teacher control methods as compared to less "dependent prone" pupils who showed little change.

Additional support for the role of anxiety in learning may perhaps be derived from the Bowers and Soar study (1961) which found that well-adjusted teachers increased effectiveness on several criteria, as a consequence of laboratory human relations training, while less well-adjusted teachers did not. The training experience itself was anxiety producing, and certainly the learning studied was highly complex.

If mental health and creativity are seen as more extreme examples of the complex learning which has been studied in relation to anxiety, then it seems reasonable that the role of anxiety will be even more important in these areas.

Presumably, the anxiety felt by the pupil at a given moment will be a joint function of the predispositions he brings with him to the classroom (temperament, past learning, out-of-school pressures and other factors) as well as the environmental stresses he finds in the classroom. This makes teacher control methods, classroom climate, and peer group social forces critically important.

Past Research in Identifying Teacher Effectiveness

Methodological Problems

Despite an extensive literature on teacher effectiveness which has accumulated over the years, one of the central points on which reviewers were in agreement until quite recently was that very limited progress had been made toward measurement and prediction (Tiedman and Cogan, 1958; Medley and Mitzel, 1959; Mitzel, 1960; AASA, 1961). Long (1957) summarized it with a quote, "'...the undercurrent of feeling [is] that researchers studying the problem of teacher effectiveness are no closer to the core of the problem than they were two decades ago.'" (p. 220).

Although the author has reviewed the problems which have contributed to this lack of progress elsewhere (1962, 1964), they provide the methodological rationale of this study so they will be reviewed briefly here. The major difficulties seem to be these:

Defining a Criterion -- The difficulty of ratings. Until recently, the research on teacher effectiveness which did not use ratings of teachers as the criterion measure was a rare one. Yet, two kinds of problems make the use of such ratings questionable. First, there is the problem that when a rater is asked to identify "good" teachers and "poor" teachers, he is asked two questions in one -- the first is the question of "What is good teaching?" (a question of values); and the second is, "Which teachers are better able to attain this ideal than others?" (a question of judgment). Attempts to reach agreement on the nature of good teaching have not usually been very successful, and the upshot is that the definitions of good teaching employed by raters are likely to be as numerous as the raters themselves. When this question is confounded with the second question -- the highly subjective one of which teachers better attain these ideals, then agreement between raters is very difficult to attain.

Medley and Mitzel (1959) reviewed the literature relating ratings of teachers to the learning of their pupils, and concluded that these measures have little in common. After quoting an extended series of researchers who had concluded that there was no relation between the ratings of teachers and the achievement which took place in their classrooms, Medley and Mitzel (pp. 244-5) comment:

> Perhaps it is a bit unreasonable to expect a supervisor to tell how much a class is learning just by looking at it. The notion that he can do so seems to be based on two assumptions: that there is a pattern (or set of patterns) of behavior exhibited whenever optimum pupil learning takes place, and that the supervisor can recognize this kind of behavior when he sees it....
>
> If there are uniform ways in which teachers and pupils behave whenever the pupils are growing in reading skill, they are not readily apparent to reasonably sophisticated classroom visitors. Raters of teacher effectiveness must seek subtler cues than these. There is no indication here of what these cues may be....
>
> The problem of relating behavior of teachers to effects on pupils is crucial not only to further research in teacher effectiveness, but to the future of teacher education itself. If the main objective of the professional part of teacher education is to teach teachers how to teach, it is highly desirable (to say the least) that clear-cut research evidence be obtained showing how the teacher must teach in order to bring about optimum pupil growth, and that such findings be made a part of every teacher's preparation. The amount of research, completed or underway, which can yield such evidence is, to repeat, astonishingly small.

The Jump from Teacher Characteristics to Pupil Change. The typical research on teacher effectiveness has gone from characteristics of the teachers, such as age, experience, training, sex, marital status, academic record, or ratings as a practice teacher to the nature or extent of change in the pupil in the classroom, if this latter variable has been measured at all. The important thing to notice about this research strategy is that it overlooks completely the question of what happened in the classroom. In theory, the characteristics of the teachers themselves (and the pupils) determine what the teachers and pupils do in the classroom, at least to the extent that they make a difference, and what the teachers and pupils do in the classroom in turn determines what change is brought about in the pupil. But when the intervening step, classroom behavior, is omitted, it is very difficult to interpret the relationships found between teacher characteristics and pupil change.

As an example, Levin (1954) reported a comparison of the subject-matter gains of pupils in the classrooms of teachers who were teaching in an area in which they had majored or minored, in contrast to gains of pupils in classrooms of teachers who were teaching a subject in which they had neither majored nor minored. The achievement gain on the part of pupils was greater in the latter set of classrooms; that is, untrained teachers produced more pupil learning than did trained teachers. While a number of explanations may come to mind to explain this disparate result, it is apparent that we cannot know which, if any of them, is the correct explanation without knowing what went on in between.

Infrequent Use of Product Measures. Considering the theoretical importance of assessing teacher effectiveness in terms of pupil-growth criteria, it is surprising that so few studies have used such a measure as the operational definition of teacher competence. In 1956, Mitzel and Gross found only 20 studies which by any stretch of the term had used a student-growth criterion to measure teacher effectiveness in elementary schools.

This situation is made more difficult still by the fact that when such an objective measure has been used, it has commonly been subject-matter achievement, and this has been treated as the only criterion of pupil growth. Results for these narrow aspects of the classroom are sometimes difficult to interpret even when significant differences are found; and even though they may be interpreted, they are so narrow as to miss major portions of the goals of education as conceived today. For example, Brookover (1945) found superior subject-matter achievement on the part of pupils in the classrooms of teachers who provided less supportive and warm emotional climates. Less learning occurred in warmer, more supportive classrooms. The first question which occurs is whether the learning represented was a learning of facts (or even overlearning), or whether it was a more understanding kind of achievement which would be more generalizable. But an even more important question is that of the extent to which other learnings were taking place in each set of classrooms. Very conceivably, pupils in the classrooms characterized by warm social-emotional climate were learning increased skills and favorable attitudes toward the classrooms in particular and education and learning in general. If this were true, the evaluation of the outcome might be quite different; but the study does not provide data on this point and leaves the interpretation in doubt.

The "All Else Equal" Assumption. This dilemma is caused by the usual experiment following the old, classical, single variable model of physics, in which everything is held constant but one variable, and it is varied systematically while the consequences are measured. In education, it has been more frequent to assume "All Else Equal" but not to assure it, so that results such as those of Brookover's emerge. But if there is one thing that may be suspected, it is that all else is seldom equal. For example, in the study cited by Levin, one of the possibilities that immediately occurs is that teachers who were not trained in the subject matter they were teaching worked harder at it, and as a consequence taught better. The logic of the experiment assumed similar effort on the part of the two groups of teachers, otherwise it would make no sense to study differences in their training in relation to differences in pupil learning, but this assumption is obviously unreasonable. Similarly, in Brookover's study the results have meaning only if one assumes all other pupil change to be identical in the two sets of classrooms, and this is not a tenable assumption either. Similarly, in the few instances in which the effect of the classroom on a pupil has been studied, it has usually been assumed that the classroom affected all pupils similarly, but this is an equally untenable assumption when it is examined. This has been especially common when the question at issue has concerned the affective aspects of the classroom and their effects on the pupil.

Problems of Measurement and Analysis. Almost certainly the problems which have been presented by past researches have come about because measures of numbers of the important aspects of the classroom, such as social or emotional growth of the pupils, or objective measures of teacher-pupil behavior in the classroom, have not existed. Early researchers measured the few aspects of the classroom for which they had the means, and ignored the rest because there was nothing else to be done. Similarly, relatively few measures of the classroom and pupil change have been taken and related to each other at once, and the "All Else Equal" assumption has been made, because to handle more than one, or two, or three variables at a time was so demanding computationally as not to be feasible. But recent advances in the measurement procedures available, and the advent of electronic computors as a means of handling computations, both converge to produce the possibility of studying much more of the complexity of the classroom simultaneously so as to find out which of the multitudinous interactions are important in determining the outcome to the individual pupil.

Stanley (1966, p. 224) has quoted Fisher as saying:

> No aphorism is more frequently repeated in connection with field trials, than that we must ask Nature few questions, or, ideally, one question at a time. The writer is convinced that this view is wholly mistaken. Nature, he suggests, will best respond to a logical and carefully thought out questionnaire; indeed, if we ask her a single question, she will often refuse to answer until some other topic has been discussed.

This is the methodological context in which the present project is placed.

Studies Relating Observed Classroom Process to Pupil Change

A number of studies have related cognitive aspects of classroom process to pupil change. Bellack and others (1963, 1965) have formulated a system for describing the logical processes occurring in the classroom. Although the study was primarily a descriptive one, teacher use of various categories was studied in relation to pupil achievement on a four-day unit in economics, without significant relationships being found. Probably the best known outcome of the study was the description of "the rules of the game" -- a description of typical teacher-pupil behavior in the development of subject matter.

Taba and others (1964) have developed a social studies curriculum for the elementary school which emphasizes strategies of thinking. In connection with this work, she has also developed a category system for classifying teacher-pupil behavior and has found significant gains in pupil ability to make inferences.

Gallagher and Aschner (1963) developed an observation system for categorizing teacher-pupil verbal behavior which followed the model of Guilford's level of thinking. They were able to show that teachers whose questions more frequently required divergent thinking seemed to produce more divergent thinking on the part of their students in contrast to teachers who used more cognitive memory questions.

Since this project is primarily concerned with the affective and control aspects of teacher behavior in the classroom, studies dealing with these aspects will be reviewed in somewhat more detail.

Probably the most important early work is a series of studies by H. H. Anderson and his colleagues (Anderson, 1939; Anderson and Brewer, 1945; Anderson and Brewer, 1946; Anderson, Brewer, and Reed, 1946). Although conducted with very small numbers of teachers, they appeared to show that teacher behavior which was "dominative" in contrast to teacher behavior which was "integrative" tended to be reflected in differences in behavior on the part of the pupils: pupils in the dominative classroom showed generally less independence, although with some tendency to reject the teacher; whereas pupils in the integrative classrooms showed more spontaneity and initiative, participated more freely, and involved themselves in problem solving. In addition, these studies indicated that the same teacher from one year to the next tended to create similar patterns of behavior in pupils, even though the pupil groups differed from year to year. An excellent review of the historical development of this area of research can be found in Ober (1965).

Studies Using Flanders' Interaction Analysis. The next major series of researches, and a series which is most relevant to this study, is reported by Flanders (1965). In it, he traces the development of the system of interaction analysis which was employed in this project, and reports, as well, a series of findings in relation to achievement and attitude of pupils in the classroom. The typical plan of the early studies was one in which a number of classrooms, usually thirty to thirty-five, were surveyed by the use of a pupil attitude instrument, and those classrooms were selected for observation in which pupils tended to have the most favorable or unfavorable attitudes toward the teacher and schoolwork.

In this series of studies, similar results were found both in Minnesota and in New Zealand. Although New Zealand teachers used somewhat more direct influence than did teachers in Minnesota, in both cases more favorable pupil attitudes were associated with more indirect teaching -- greater use of praise, clarifying and using pupil ideas, and asking questions. The next phase in the development of the research program was a study in which two-week units of study were constructed in mathematics and social studies. Teachers were selected to represent the broad range of teacher styles by selecting initially the eight high and low scoring mathematics classrooms and the eight high and low scoring social studies classrooms on the attitude inventory. When observation was conducted in the classrooms, it was found that the mathematics classrooms broke naturally into seven indirect and nine direct teachers, and the social studies into seven and eight teachers respectively (one classroom was found to have a number of special students in it and was dropped from the study). The major differences between the indirect and direct teachers were described by Flanders as ones in which the indirect teachers were more attentive to what the students said and made better use of student ideas, whereas direct teachers gave more directions and their students resisted them more. A surprising result was that indirect social studies teachers appeared to lecture more than direct teachers, but this trend did not hold for the mathematics teachers.

When achievement of pupils in each of the four sets of classrooms was studied, adjusted for differences in initial ability by covariance, it was found that pupils in indirect classrooms learned significantly more, both in mathematics and social studies. Differences in the expected direction were also found in pupil attitude.

Pupils were also classified by their dependence-proneness, and by IQ, and the data were analyzed separately for these subgroups in relation to differences in teacher influence. Differences in achievement were not found between dependent-prone and independent-prone pupils, nor did different IQ level pupils respond differently to the two extremes of teacher influence.

A still later study in this series of studies, was one done by Amidon and Flanders (1961) in which pupils who were classified with respect to dependence-proneness were exposed to role-played direct or indirect teacher behavior in a unit in geometry. In this study, dependent-prone pupils were found to achieve more in the classes in which indirect teacher influence was role-played, whereas there was no difference for less dependent-prone pupils.

LaShier (1966) has reported a study in which the relations were examined between the ratio of indirect-direct teacher behavior as measured by Flanders' Interaction Analysis, and achievement gain measured by an experimentor-constructed test, and pupil attitudes as measured by the Michigan Student Questionnaire. The study used data collected in the classrooms of ten student teachers teaching a unit on animal behavior from the BSCS biology curriculum. A correlation significant at the one per cent level was reported between the I/D ratio and achievement gain. It was virtually unchanged by extracting the influence of pupil mental ability by partial correlation. Positive correlations significant at the five per cent level were also reported between class medians for pupil attitude and median achievement gain, and between I/D ratio and pupil attitude.

Furst's study (1967) was a further analysis of data collected by Bellack in an earlier project (1963), and analyzed further in a second (1965). Furst categorized the four tapes of each of Bellack's fifteen teachers by Flanders' Interaction Analysis, and formed a composite of three measures taken from this system. The measures were: (a) ratio of extended indirect teacher influence to extended direct teacher influence, (b) ratio of indirect teacher influence immediately following student talk to direct teacher influence immediately following student talk, and (c) steady state student talk. She also used three Bellack measures as a composite, and the six together as a third composite. She found significant differences in achievement associated with teacher scores on all three of the composites, even though Bellack had not found differences in achievement which were significantly related to individual categories of his system.

Studies Using Other Observation Systems. Medley and Mitzel (1959) studied the relation between teacher-pupil behavior in the classroom as measured by the 1958 Observation Schedule and Record (OScAR) and pupil growth in reading, growth in group problem-solving skill as measured by the Russel Sage Social Relations Test, pupil-teacher rapport, supervisors' ratings, and teachers' self-ratings. The influence of numbers of extraneous variables such as the initial achievement of pupils, their intelligence, school to school differences, and grade level were controlled by statistical analysis. The results for the criterion measures were reported in terms of the beta weights for the classroom behavior dimensions and the control variables, and the resulting multiple correlations.

Reading growth appeared to be determined primarily by grade level, with a minor influence which was contributed by emotional climate of the OScAR, but none of the other variables made a significant contribution. Supervisors' ratings appeared to be determined primarily by OScAR emotional climate, and secondarily by initial level in group problem-solving skills, but with a negative weight; none of the other predictors or control measures contributed much. None of the other multiple correlations were significant, but the major contributor to pupil-teacher rapport was again emotional climate from the OScAR. Teachers' self-ratings appeared to be determined primarily by classroom social organization as measured by the OScAR, negatively weighted, and pupil mental maturity. Growth in group problem-solving skill, although so low in multiple correlation as to be doubtful in meaning, appeared to be determined primarily by initial problem-solving skill, with a negative weight, and the mental ability of the pupils involved.

Although interpretation of three of these results is uncertain because of the failure of the multiple correlation to reach significance, an interesting aspect of the results is the extent to which they appear to be predicted by observation of teacher-pupil classroom behavior using OScAR.

Another important finding was that supervisors' ratings of teacher effectiveness were apparently determined primarily by pupil-teacher rapport in the classroom, in contrast to the contribution of reading growth which was negligible. The authors close with a very pungent and incisive commentary on the use of ratings of teacher effectiveness in the light of their failure to relate to pupil growth (the same summary which was cited in an earlier section of this chapter).

In a recent study concerned primarily with a comparison of several methods of teaching reading to culturally disadvantaged children, Harris and Serwer (1966) also report on observation in the classroom utilizing a form of the OScAR which was developed primarily for recording the teaching of reading. Although the use of OScAR-R was apparently not a central aspect of the study, and although no data are reported, the summary statement was made that there were no significant correlations between any of thirteen scales developed from

OScAR-R and any of the measures of pupil change.

Miller (1964), in a research which was a follow-up of earlier work by Hughes (1959) and Miller (1958), studied differences in pupil achievement and attitude resulting from two styles of teaching which differed primarily on cognitive dimensions, but to some degree on the dimensions of teacher control. Each of four teachers taught two groups of pupils, teaching one group in a "responsive" style and the other group in a "directive" style. The eight classes were all taught the same ten class-sessions of material on economics. In both cases, however, the teachers behaved in a warm, friendly, supportive fashion toward pupils -- the difference in treatment consisted in the manner of dealing with subject matter.

As predicted, pupils under the responsive style of teaching demonstrated a deeper level of understanding of the material by their comments in class discussion. Pupil comments under directive teaching were restricted almost entirely to recognition and recall. As predicted, pupils under the responsive style of teaching expressed more positive attitudes on questionnaires. The prediction that there would be greater learning of factual material by pupils under the directive style of teaching was not supported. In contrast, it had also been predicted that the pupils under the responsive style of teaching would demonstrate a higher level of understanding as measured by achievement gain, but this hypothesis was not supported either.

In the sense that personal relationships between pupils and teacher were supportive in all conditions, this is a cognitive study of teacher behavior in relation to pupil learning. But the responsive style of teaching provided pupils with considerably more freedom in their dealing with the subject matter under study, and in this sense probably presented a rather different pattern of teacher control. Probably the study is best classified as one of cognitive and control variables, but not primarily of affective variables.

Solomon, Bezdek, and Rosenberg (1963) have reported a study of teacher behavior at the college level related to pupil achievement and a number of measures of attitude. Twenty-four teachers of evening classes in introductory American government at thirteen schools were studied. Teacher classroom behavior was rated on a series of scales by an observer team, and was also tape recorded at the same time. The tape recordings were analayzed into broad categories, such as "organizing," "hypothetical," "opinion," "factual," "interpretation," and "personal reference." Teacher feedback to students was also categorized in terms of the amount of information given about the correctness of the student's statement, and the type of reinforcement, if any. Student speech was also categorized in the same categories as the teacher's speech. A questionnaire was administered to students asking for ratings of a variety of aspects of the teacher's behavior, such as informality, enthusiasm, sensitivity, encouragement of argument, use of criticism, self-reference, etc. A questionnaire was also completed by the teacher indicating his goals and motives in teaching the course.

Altogether, the instruments produced 169 variables which were factor analyzed to produce eight factors. From this analysis, factor scores were then computed for each of the teachers.

One of the criteria related to the measures of classroom process was a multiple choice achievement test administered to the students in the classes at the beginning and end of the semester. One portion dealt with factual knowledge, another with comprehension. Regressions of initial scores on gain were computed, and the decision was made that measures of raw gain could be employed.

Factor one, permissiveness versus control, was significantly related to comprehension gain in a chi-squared analysis, with the greatest gains occurring for the middle level of the factor.

Factor scores for the teacher on each factor were then correlated with mean classroom scores for factual gain, comprehension gain, and a number of ratings of the teacher and the class by the pupils. Comprehension gain was related in linear fashion to energy (vs. lethargy) and to flamboyance (vs. dryness). Factual gain was related to clarity and expressiveness (vs.obscurity and vagueness).

A series of specific student evaluations, all of which reflected favorably on the instructor or the course, were also associated with clarity and expressiveness on the part of the instructor, rather than obscurity and vagueness. The only other factor which related to student ratings was that of warmth (vs. coldness) which related to personal ratings of the instructor.

Perkins (1965), in a study of underachievement in fifth grade pupils, selected a sample of 36 underachievers and 36 achievers for study. Underachievers were classified as those whose previous year's grade point average fell at least a standard error of estimate below expectancy based on his IQ. Achievers fell between the expectancy and one standard error of estimate above it -- hence were not high overachievers.

Both pupils and teachers were observed in the classroom by a time-sampling procedure using an instrument developed by Perkins (1964) for the purpose.

Perkins' major emphasis was on differences in the classroom behavior of achievers and underachievers, but he presented results for two separate factor analyses which are of interest here. One was an analysis of relationships between classroom behaviors and change in achievers, and another between the same variables for underachievers. In these, he found three factors -- "quiet study," "teacher leading recitation," and "individual work" -- which in general had high loadings associated with increased achievement; however, the fourth factor "teacher lecturer-criticizer" had high loadings associated with loss in several achievement areas.

The "quiet study" factor was associated with increases in GPA for all pupils. Both "teacher leading recitation" and "student individual work" were related to gains by achievers more often than by underachievers. The "teacher lecturer-criticizer" was related to withdrawal on the part of both underachievers and achievers, to underachievers not watching or listening, and to loss by both groups in several achievement areas. However, both groups gained in reading vocabulary in association with this factor.

Another study which is similar in methodology to the one reported here is a study by Spaulding (1965), which grew out of a study by Sears (1963). In both, observed classroom process was reduced to factor scores and related to multiple pupil product measures. In the later study, data were collected in 21 classrooms, grades 4 and 6, in upper socio-economic level schools in California. Observation was conducted in the classrooms using an observation schedule then under development at the Laboratory of Human Development, Stanford University, which dealt only with teacher-behavior. Each teacher wore a wireless microphone, and her interactions with pupils were tape-recorded for later categorization from the tape. Altogether, 113 categories and sub-categories of teacher behavior were subjected to factor analysis after the elimination of some because of low reliability. From the factor analysis, 17 factors were isolated by centroid extraction and varimax rotation, for which factor scores were calculated for each of the 21 teachers. These factor scores were then correlated with pupil measures at the end of the year for level of self-concept, differentiation of self-concept in several areas, the mathematical and reading subtests of The Sequential Tests of Educational Progress, and four measures of pupil creativity taken from the Kaya Puzzles Test. A number of situational characteristics such as class size, proportion of boys, sex of the teacher, etc., as well as pupil mental ability and chronological age, were taken at the beginning of the year and used as control measures.

The measures of particular interest for this project are the relations between the factor scores and the pupil product measures at the end of the year. A series of hypotheses derived from educational and psychological theory and from past research on teacher effectiveness were posited and tested by identifying the factors which looked most like the dimensions of earlier research or theory. For example, one of the patterns of teacher behavior examined was that of "integrative" teacher behavior as described by Anderson (1939). It was predicted that it would be associated with superior pupil originality, flexibility, and self-concept. Four factors were found which resembled Anderson's description to some degree; one which resembled it relatively closely, and three others which had some elements in common with it. The one which closely resembled integrative teacher behavior was described as "supportive, receptive, responsive regarding pupil ideas and concerns" but did not relate significantly to pupil status. Of the other three factors, one correlated with height of self-concept, but no other relationships were significant.

A "learner-supportive" syndrome similar to that identified by Withall (1948) was hypothesized to be associated with originality, flexibility, and high self-concept. The factor most like Withall's "learner-supportive" behavior did not relate to any of the pupil measures: a second correlated significantly with self-concept level, and a third with differentiation of self-concept.

The pattern of the "academically oriented teacher" as described by Bush (1954) was predicted to be associated with superior subject matter achievement. One factor was found which resembled this pattern of teacher behavior, but it did not relate significantly to pupil achievement.

Bush's "counseling" teacher behavior was predicted to be associated with higher pupil level of self-concept. The factor which was most like this pattern of teacher behavior did correlate positively with self-concept, but at a level which could have been chance.

Another pattern identified by Bush as fostering creativity in pupils was used as a basis for searching for factors which appeared to be similar to it. Although there was no factor which looked similar to this pattern of behavior, the factor scores of the various teachers were scanned, and one teacher found who seemed to exemplify the pattern. However, presence in his class correlated negatively with standing in creativity at the end of the year, for both flexibility and originality. These relationships were expressed as beta weights, rather than correlation coefficients, and significance levels were not reported. It was clear, however, that they were opposite to the predicted direction.

Another prediction was that teacher behavior with a high degree of private or semi-private communication with children, with overt facilitation of task-oriented behavior, with concern for divergent responses, with attentiveness to pupil needs, and with lack of expression of negative affect should be supportive of pupil growth on all dimensions. Many of the factors contained aspects of this pattern of teacher behavior, and on this basis four were predicted to correlate positively with pupil growth, and eight to correlate negatively. Of the four predicted to correlate positively, three had significant positive correlations with self-concept, but none correlated significantly with any of the other product measures. Of the eight factors predicted to correlate negatively with all of the product measures, six had at least one significant correlation: four related negatively with self-concept only, one correlated negatively with both height and differentiation of self-concept, and one correlated negatively with both of these product measures and with two of the creativity measures as well. Finally, one of the factors correlated positively (opposite to the predicted direction) with achievement in reading.

"Democratic" leader behavior as described by Lewin, Lippitt and White (1939) was predicted to be associated positively with all of the product criteria. Three factors contained measures with elements in common with the "democratic" pattern of behavior, although none of the factors appeared to be a very good fit. One correlated in the predicted direction with level of self-concept, and another correlated opposite to the predicted direction with two of the creativity measures.

It seems fair to summarize that although patterns of teacher behavior identified by factor analysis of measures derived from observation of teacher behavior did correlate with pupil status at the end of the year, the results are mixed in relation to the theoretical predictions made.

Sensitivity Training and Effective Teaching. Considerable evidence exists that intensive but relatively brief periods of sensitivity training are capable of bringing about changes in behavior of the sort which should increase skill in the basic core of teaching skills discussed earlier. Most of the evidence comes from research in training industrial leaders and educational administrators, but the skills identified ought to transfer readily to the classroom, and some research has been done on sensitivity training of classroom teachers which showed important changes in teaching skills. This training experience is a small group workshop developed by the National Training Laboratory, an agency of NEA, and other similar experiences (Chase, 1951; Chase, 1957;

Miles, 1959). Several kinds of experiences are involved: 1. the training group, an unstructured, process-oriented discussion group; 2. skill practice, with roll-playing, practicing group observation, and other structured learning experiences; and 3. theory sessions, designed to provide a cognitive frame of reference within which to integrate the learnings of the other two. A basic element in this is the elicitation of behavior under conditions which make feedback acceptable--psychological safety.

Although the various studies of sensitivity training show considerable scattering of methods used, problems studied, and evaluative methods applied, taken together they show change in behavior in the desired direction. The changes appear to be ones in which the trainess become self-insightful and sensitive to the needs and dynamics of others, as individuals and as groups. As a consequence, they become more skillful in working with others, in eliciting cooperation, in fostering involvement, and encouraging growth in their co-workers and subordinates. These results support the hope that such training for teachers would lead to similar changes in their classrooms (Stock, 1957; Gibb _et_ _al_, 1955; Mann and Borgatta, 1959; Blake and Mouton, 1956; Maier, 1952; Combs, 1954; Clark and Miles, 1954; Miles and Corey, 1957).

A recent study by the author and a colleague (Bowers and Soar, 1961) demonstrated that a similar three-week workshop experience brought about significant changes in teacher behavior in the classroom and the group skill acquired by the pupils of these teachers. It was also found that an advanced method of analysis was necessary in order to demonstrate these changes. When an analysis was applied which examined differences between means of the control group and the experimental group (analyses of variance and covariance) no differences were found; but when an analysis was applied which permitted different regression slopes of posttest results on pretest performance and personality measures for the two groups, significant differences emerged. What happened in the analysis of covariance was that well-adjusted teachers, when trained, changed in one direction in posttest performance, and less well-adjusted teachers changed in the opposite direction, so that the two sets of changes cancelled each other and resulted in no change at the mean. However, the more complex analysis, the Johnson-Neyman Technique (Johnson and Jackson, 1959), demonstrated significant change. Perhaps some of the negative findings of such experimental techniques applied to groups which are heterorgeneous in personality may be accounted for on this basis.

One of the questions in interpreting the results of this study was that of accounting for the finding that a considerable proportion of the trained teachers changed in a direction opposite to that hypothesized, while another subgroup changed in the expected direction. One explanation (and one which has been invoked in at least one industrial study) was that the typical teacher in the research was the only teacher in her school who participated in the training experience; and that the school to which she returned was frequently a school in which there was little support for increasing pupil participation in the work of the classroom. The possibility was advanced that the teacher in such a situation felt the need to show that she had not changed as a consequence of the training experience, and indeed may have leaned over backward to show that she had not. A question left unanswered by this interpretation was that of whether a larger proportion of teachers might have changed in the expected direction had they returned to a school in which there was support for the sort of change toward which the workshop was

2

directed -- a school in which a group of other teachers had also had experience with the workshop, and in which the principal was knowledgable about the ideas presented in such a workshop, and supportive of change.

Summary

Examination of the goals of education in the areas of achievement, mental health, creativity, motivation and group skills, suggests that the ways of achieving these goals are compatible.

Problems in validating relationships between classroom conditions and the associated changes in pupils were summarized, and more recent studies which have capitalized on newer procedures in classroom observation and statistical methodology were reviewed. Studies of classroom climate and control were reviewed in greater detail because the emphasis in this project deals primarily with those aspects of classroom process. Finally, research relating sensitivity training to change in the behavior of leaders in general, and teachers in particular, was reviewed for its relevance to change in teacher behavior which was expected to facilitate pupil growth.

Chapter 3

Procedure

The background of theory and research cited in the first two chapters led to the formulation of five interrelated areas of study. Since they were global and exploratory rather than limited and specific, they were stated as problems rather than hypotheses.

Statement of the Problem

1. Theory and past research identify classroom conditions which should foster a variety of kinds of pupil growth as compatible. These can be identified as a common core or constellation of classroom process.

2. This constellation can be parsimoniously measured by means of factor scores.

3. Aspects of this constellation, expressed as factor scores, can be meaningfully related to a variety of aspects of pupil intellectual, social, and emotional growth; but pupil personality will interact with these process factor scores in determining pupil growth.

4. Similarly, it will be possible to identify a constellation of classroom process and product measures of pupil growth which will be meaningfully related to presage measures of teacher personality, intellectual level, training, and experience.

5. Sensitivity training for the teacher will result in changes in the classroom which can be tested by utilizing factor scores derived from the analysis of process and product measures.

Design of the Project

In general, the design of the project was a fall and spring testing of a variety of pupil characteristics in grades three through six, with observation of the classroom during the year. The following summer there was a sensitivity training laboratory for a subgroup of the teachers, with observation of the classrooms the following year, and spring testing of the pupils again.

In more detail, the sequence was: in the late summer and early fall of the first year of the project, teachers were recruited to participate. This was done by meetings with the staffs of four elementary schools which were suggested by central office personnel as likely ones to participate. In the meetings with the teachers, the general goals of the research were explained, the kinds of time demands which would be made on teachers explained, and the sort of reporting of results back to teachers which would be carried out detailed. Then the investigator left the meeting, and teachers and the principal of each school discussed whether they wished to participate or not. As a consequence of the meetings, the entire staffs of four elementary schools, grades three through six, volunteered.

At the beginning of the school year data collection was begun with the administration of the achievement, personality, and creativity tests to all of the pupils in all of the schools, and a test of group problem solving skills was administered to each classroom. At about this same time, teachers of the various classrooms were given personality tests to complete on their own and return to the project director. During the middle portion of the year, classroom observations were carried out using two observation schedules. Then, toward the end of the school year, all of the tests administered to pupils at the beginning of the year were repeated, and in addition, the measures of attitude toward the teacher and the school were administered, as well as the pupil's report of outside work.

After these various measures were collected, a sensitivity training laboratory was conducted for a subgroup of the teachers during the summer. This was the same sort of training experience offered to the teachers in a previous project (Bowers and Soar, 1961) and was presented by the project director, who was one of the trainers in the earlier project. Although the conclusions that can be drawn from this portion of the study are limited in the sense that the trained teachers were a subgroup who volunteered rather than being randomly assigned, the criterion data were already being collected for other purposes, so that an assessment of the outcomes of the training experience was quite inexpensive, and seemed worthwhile in terms of the partial replication afforded.

During the second year of the project, observations of the classroom were carried out during the middle of the year in the same manner as the first project year. The same measures that had been completed the spring of the first year were repeated the spring of the second year, under the assumption that this would permit identifying two years of growth on the part of the pupils, separately by year. There were two exceptions to this general procedure, however, in that a new class of third graders entered the project in the fall of the second year, and consequently were tested then; at the same time, a class of sixth graders left these schools so that only one year's data was collected from them. In three of the four schools in the project, the school system itself administered the same achievement tests at the beginning of the sixth grade year, so that an additional set of achievement test measures was available for those pupils. These were administered by the teachers, and were the only measures not administered by project staff.

The statistical analyses of these data consisted of several phases: for the first year, the data derived from pupils (the product data) were reduced to punched card status, and the measures taken in the fall and spring of the year were used to derive residual true gain scores; the data of the better standardized of the observational schedules were punched, tabulated into matrices, and measures derived; and items from the observation schedule which was developed in the project were tested for reliability, and those with at least minimum reliability were pooled across observations. The observational data (process measures) were then factor analyzed; overlapping measures were discarded; and the remaining measures were factor analyzed again and reduced to factor scores. Relations between these classroom process measures, and the pupil product measures were calculated.

The data for the second year were similarly reduced; and residual true gain measures for the pupils over two years were studied in relation to the different kinds of classrooms identified by the classroom process measures. Finally, composite measures of classroom process and products for the successive years were used to evaluate teacher change associated with sensitivity training.

Subjects

The subjects in the study consisted of the teachers and pupils in fifty-seven classrooms, grades three through six, in four elementary schools from two systems in a metropolitan area of central South Carolina. Since it was necessary to wrok with volunteers, the sample does not represent a random selection of classrooms. However, it does represent all the classrooms at the relevant grade levels in the four schools involved. This offered two advantages: first, less secure teachers were probably encouraged to participate since the other teachers in their school were doing so, so that restriction of variability did not take place as it might have if teachers had volunteered individually. Second, collecting data in all classrooms in a given school seemed the only feasible way to follow pupils over a two year period without interference in the normal school routine. In general, informal observation suggests that most of the span of socio-economic levels was involved in the children in the schools, but probably the upper-middle was more heavily represented. Probably few, if any, culturally deprived children were represented, and relatively few of the upper-upper socio-economic level pupils were involved, but the other levels were included, if not necessarily representatively.

There almost certainly was selectivity in the kinds of schools which volunteered, however. Being observed repeatedly and at unpredictable times offers a degree of threat to teachers which is often not recognized, even by a principal who is close to his teachers. In addition, administrators are probably not enthusiastic about welcoming observers to their schools unless they feel the schools to be "good" ones. The result almost certainly was that the schools involved in the project were high morale schools, and ones which are well regarded by their systems. It was the reaction of visitors to the project from other cities that these were unusually "good" schools. Comparative data to this point will be presented later in the report in terms of observational data from one of the standardized observation schedules.

Measures

The measures used in the project will be discussed according to a schema of Mitzel's (1960). He divides measures into three categories: presage, process, and product. Presage measures are those concerned with the characteristics of the teacher before she enters the classroom -- such as personality characteristics, intelligence, age, experience, training, marital status. Process measures refer to measures of the processes that take place in the classroom -- emotional climate, the degree and manner of control exercised by the teacher, the interpersonal relationships that exist. Product measures have to do with changes produced in the pupils as a consequence of the time spent in the classroom -- achievement, growth in creativity or in social skills, personality changes.

Presage Measures

Although the majority of measures of teacher characteristics reflected aspects of personality, other measures were included which are commonly used to evaluate teachers, such as *National Teacher Examinations* scores, years of experience, and professional preparation.

The Minnesota Multiphasic Personality Inventory (MMPI). The ten clinical keys were used in the analyses of data, as well as several special keys which seemed to be particularly relevant to the work of the teacher. Since the MMPI is probably the best known and most widely used of the structured personality inventories, the dimensions measured by the clinical keys will not be reviewed here. Where keys predicted aspects of teacher effectiveness, the probably interpretation of the keys will be discussed in that context in terms of the relevant description of personality; otherwise information on the inventory may be found in Welsh and Dahlstrom (1956) and in Dahlstrom and Welsh (1960). There is very little question that the MMPI is the structured inventory whose empirical validity has been most thoroughly studied.

Special Keys. The special keys that were also scored were: Welsh's A and R, Barron's ES and the Cook-Medley Ho, PV, and TA scales. The descriptions of these scales are as follows:

1. Anxiety (A). This scale was developed by Welsh to represent the first factor which has usually been found in factor analyses of the MMPI. Although named Anxiety, the content of the scale reflects slowness in thinking, negative emotional tone, lack of energy, pessimism, and personal sensitivity in the sense of over-sensitivity.

2. Repression (R). This measures the dimension which usually emerges as the second factor in analyses of the MMPI. It reflects concern about health, physical symptoms, emotional adjustment, stimulation by social situations, lack of agressiveness, and lack of social dominance. High scorers on the scale are characterized by repression and denial; low scorers, by externalized and "acting-out" behavior.

The A and R scales were included in the study because Welsh found the two scales together summarized much of the reliable variance of the MMPI (Welsh and Dahlstrom, 1956, pp. 264-8). As will be noted in the section on factor analytic studies of the MMPI, this is representative of the school of thought that two dimensions account for most of the individual differences which the inventory as a whole assesses.

3. Ego Strength (ES). This scale was originally built

as a predictor of success in psychotherapy, but collateral study with it has indicated that it may offer promise in situations in which general personality integration, adaptability, and resourcefulness are important. It has correlated moderately with intelligence, general energy level, self-confidence, breadth of interest, tolerance and lack of ethnic prejudice, and social ease (Welsh and Dahlstrom, 1956, pp. 226-34).

4. *Hostility and Pharisaic Virtue (Ho and PV)*. These keys were developed by item analyzing MMPI records of extreme criterion groups selected on the basis of the *Minnesota Teacher Attitude Inventory* (MTAI) (Cook and Medley, 1954). Further selection of items took place on the basis of content. A person scoring high on the Hostility scale is one who has "...lille confidence in his fellow man. He sees people as dishonest, unsocial, immoral, ugly, and mean, and believes they should be made to suffer for their sins." (pp. 417-18). High scores on the PV key suggest preoccupation with ideas of sin and punishment and rigid moral values. Reliabilities for the keys range between .85 and .90 and correlations with the MTAI are generally in the upper forties.

Research Relating the MMPI to Teacher Effectiveness. The MMPI has been related to teacher effectiveness in a number of studies, but most of these used ratings as the criterion measures and student teachers as subjects. The problems raised by these procedures have been discussed in Chapter 2, but a number of the studies will be reviewed briefly.

Medley and Williams (1957), (not using student teachers or ratings) found that Ho and PV predicted pupil liking of the teacher (as measured by the *My Class* inventory). Neither scale predicted growth in reading, however. Michaelis (1954) found that Pt and Sc differentiated ratings of student teachers, but not at the one per cent level. Tyler (1954) found little relation between practice teacher ratings and MMPI scores, but questioned the reliability of his criteria. Tanner (1954) attempted differentiation of practice teachers rated "good" and "poor," and found that only K distinguished the two men's groups at the five per cent level. The women's groups were distinguished by K, D, and Pt. Gowan and Gowan (1955) developed a key for teacher prognosis (TP) by item analysis which appeared to be successful in predicting ratings. Moore and Cole (1957) found the sum of T scores on the clinical keys to be related to the practice teaching ratings of a restricted group of students on whom raters agreed. The TP key was not significantly related. Michaelis and Tyler (1951) found Hy to be related to practice teaching ratings at the five per cent level, with Pd and Pt approaching significance.

Gough and Pemberton (1956) developed a configural scoring procedure for predicting practice teacher ratings, and found eight "signs" with some discriminating value on cross-validation.

It is interesting to note that Pt has most often emerged as the significant predictor, with K, D, Hy, Pd and Sc also appearing. It was not at all clear that these particular keys would be the ones which theory would suggest as the effective discriminators. After the fact, however, some of them can readily be integrated into theory.

Earlier work by the author and a colleague (Bowers and Soar, 1961) showed that subgroups of teachers who were able to profit from the sort of sensitivity training which was also studied in this project were identifiable by several subkeys of the MMPI, particularly Pd, Pt, Sc and R. Using these keys as discriminators, subgroups of teachers were found, some of whom were able to increase their effectiveness of teaching sharply as a consequence of the experimental training procedure; while other subgroups, who differed on these keys, taught materially less well by the same criteria following the training experience.

Other research by the author (Soar, 1962) studied relationships between four inventory measures of teacher personality characteristics and attitudes (including the MMPI) and observed teacher-pupil behavior in the classroom, as measured by Medley and Mitzel's Observation Schedule and Record (OScAR) (1958), and the Russell Sage Social Relations Test, the same measure of group problem solving skills used in this study. When the four inventory measures were related to the measures of classroom process, four subkeys of the MMPI emerged as the most effective predictors, and when the number of predictors was increased to ten, the predictor pool was still limited to the MMPI. The four most valid measures, and their integration into a theory of teacher effectiveness were presented as follows:

> The measure which shows the highest relationship with the Canonical Composite is Pd (psychopathic deviate), followed by Sc (schizophrenia), Pt (psychasthenia), and Hy (hysteria). Apparently, the most critical dimension here is the maturity, responsibility, depth of affect and ability to feel personal and social loyalties which are missing in high Pd teachers. Following, and approximately as closely related are the maladjustive tendencies measured by Sc which block effective interrelationships. Dahlstrom and Welsh (1960) characterize high Sc people as "...constrained, cold, and apathetic or indifferent... remote and inaccessible, often seemingly sufficient unto themselves." (p. 71). Whereas high Pd people do not feel normal anxiety, these are people who are blocked by anxiety -- so caught up in their own intrapersonal concerns as to have little interest or energy for others. In short, they have little of self to share, and have difficulty relating to others despite concern about feelings of alienation.
>
> Presumably, the interpretation of high scores on Pt is

> similar -- that high scoring teachers tend to be rigid and lacking in self-confidence which limits their effectiveness with others.
>
> The fourth dimension is the repressive tendencies underlying Hy. Presumably this has importance in the distortion of perception associated with it. Effective relations are built on vertical perception of self and others, and an honest representation of self to others.
>
> These four measures, as interpreted, can be put together into a coherent picture of personality resources basic to skillful interpersonal relationships: skillful interaction with pupils requires responsibility and depth of affective relationship on the part of the teacher; it requires that she be well enough adjusted that much of her energy is not drained off in dealing with her own intrapersonal tensions; that she be self-confident and flexible, and that she be able to perceive herself and others clearly and represent herself honestly in communication with others. A teacher must, in short, care; must not have this concern blocked by her own intrapersonal tensions or doubts; and must be relatively free of distorting mechanisms, and able to enter honestly into relations with others. Perhaps what this reduces to is that a teacher must be able to use her "self" openly, clearly, and honestly in her interactions with pupils (pp. 67).

When the same data were analyzed by factor analysis, six of eight factors had meaningful loadings on both personality measures from the MMPI and the classroom process measures.

When these data were cross-validated on a second sample of teachers drawn from a different geographic area, the findings largely failed of cross-validation. However, an adjunctive study which used a subsample of the teachers in this cross-validation sample, and which also employed two additional observation schedules, did produce data which indicated similar effectiveness of the MMPI in relating to classroom process variables. A report of a factor analysis of the data of this adjunctive study can be found in Fowler and Soar (1963), and a discussion of possible reasons for the nonreplication of the second sample in relation to the first can be found in Soar (1963).

Factor Analytic Studies of the MMPI. There appear to be two points of view about the factorial structure of the MMPI (Lingoes, 1960) which differ in emphasis. One is essentially a two-factor approach; Wiener (1948) used the categories of "subtle" and "obvious," and Wheeler, Little, and Lehner (1951), "neurotic" and "psychotic." On the other hand, there is the point of view supported by Lingoes (1960) and Harris and Lingoes (1955), which offers considerable support for a minimum of seven factors and the possibility of more.

The difference in these points of view is at least partially one of emphasis. Messick and Jackson (1961) support the two-factor theory emphasizing the concept of response set, but comment that "... only two major factors and two or three minor ones are necessary to account for interrelations among the scales." (p.300). Later work tends to minimize the importance of response set as a principal determinant of the results of structured inventories such as the MMPI. (McGee, 1962; Rorer, 1965).

Other Measures. In addition to the MMPI, data were available from a study adjunctive to this one (Baucum, 1965) which provided scores on the *National Teacher Examinations*, years of experience in teaching, and the number of semester hours in Education.

Process Measures

Two observational schedules were employed -- one which is well established and widely used; and another which was assembled for the project by drawing on other schedules and adding additional items.

Flanders' Interaction Analysis. This is probably one of the two observation schedules most widely used in recent research (the other being Medley and Mitzel's (1958) Observation Schedule and Record).

It is notable in capturing, one step at a time, the sequence of classroom interaction (Amidon and Flanders, 1962).

The categories by which teacher and pupil interactions are recorded are shown in Figure 1. Seven of the categories reflect teacher activities, two, pupil activities, and the last, a miscellaneous category of silence and confusion. Four of the teacher categories are labeled indirect influence; that is, they tend to support and to expand freedom for pupils; and three are labeled direct influence in that they tend to direct pupils, to restrict freedom, and to convey a negative affective tone.

In the use of the schedule, an observer enters the classroom, spends a few minutes getting the feel of what is going on, and then begins to write, every three seconds, the number of the category which best describes what is going on in the room at that moment. If, however, the activity changes within the three seconds, a new category is recorded. As the observer categorizes, he records these numbers in a column, in sequence. Usually the period of observation is twenty minutes, but in this project a period of observation was defined as 400 categories recorded, in order to obtain identical numbers of tallies for each teacher and eliminate the need for converting the data to percentages. After the observation is complete (usually 17-18 minutes, in this case) the numbers are recorded in the matrix as illustrated in Figure 2. The plotting is done as follows: the first two numbers in sequence are taken as a pair, the first is used as the row entry, the second as the column entry, and a tally is recorded in the cell which represents the junction of row and column. Then the second member of the first pair is taken as the first member of the second pair and this pair is again recorded in the same way.

Figure 1

Summary of Categories for Interaction Analysis

Teacher Talk	Indirect Influence	1.* Accepts Feeling: accepts and clarifies the feeling tone of the students in a non-threatening manner. Feelings may be positive or negative. Predicting or recalling feelings are included.
		2.* Praises or Encourages: praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or saying "um hm?" or "go on" are included.
		3.* Accepts or Uses Ideas of Student: clarifying, building, or developing ideas or suggestions by a student. As teacher brings more of his ideas into play, shift to category five.
		4.* Asks Questions: asking a question about content or procedure with the intent that a student answer.
	Direct Influence	5.* Lecturing: giving facts or opinions about content or procedure; expressing his own ideas, asking rhetorical questions.
		6.* Giving Directions: directions, commands, or orders to which a student is expected to comply.
		7.* Criticizing or Justifying Authority: statements intended to change student behavior from non-acceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.
Student Talk		8.* Student Talk--Response: talk by students in response to teacher. Teacher initiates the contact or solicits student statement.
		9.* Student Talk--Initiation: talk by students which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.
		10.* Silence or Confusion: pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

*No scale is implied by these numbers.

Figure 2

Sample Interaction Matrix

10
6) First Pair
Second Pair (10
7) Third Pair
Fourth Pair (6
1
1
4
8
8
8
2
3
3
10

		Second										
		1	2	3	4	5	6	7	8	9	10	Total
First	1	1			1							2
	2			1								1
	3			1							1	2
	4								1			1
	5											0
	6	1									1	2
	7						1					1
	8		1						2			3
	9											0
	10						1	1				2
	Total	2	1	2	1	0	2	1	3	0	2	14

Then the third number in the sequence is taken as the first member of the third pair and the fourth number as the second member of the third pair, and the sequences continue. Any given cell entry then, means that the row category was what was going on in the preceding three seconds and the column category is what is going on now. Thus, the number of tallies in the 8-3 cell (row 8, column 3) are the number of occurrences in which student talk in response to the teacher was followed by the teacher using the pupil's idea in developing a thought. Similarly, the 7-6 cell implies that the activity enterd there was preceded by criticism by the teacher and that this criticism was then followed by giving directions. Flanders comments that a surprising amount of classroom activity is described by what he calls the "two-thirds rule." That is, about two-thirds of the time in the classroom somebody is talking, about two-thirds of the talk is done by the teacher, and about two-thirds of teacher talk in turn is directive.

Some of the more frequently used measures derived from the matrix are:

The I/D Ratio. This is the ratio of indirect to direct teacher influence, and places the teacher on a continuum of the extent to which she is directive to pupils. The continuum is similar to Anderson and Brewer's (1945) Integrative-Dominative dimension.

I/D Ratio in Response to Pupils. A more sensitive indication, probably, of the effect the teacher will have on pupils is to calculate the I/D ratio only for rows 8 and 9 -- that is, teacher responses to pupil talk.

It seems reasonable to assume that pupils will be more sensitive to how a teacher reacts to what they have said than they will be to teacher activities in general, and if this is true, then what the teacher does immediately after a pupil comment is crucial.

Vicious Circle. This represents a situation in which the teacher gives directions, the pupils drag their feet, the teacher criticizes them, gives more directions, and the pupils drag their feet some more. It is represented by the 7-6, 6-6, 6-7, and 7-7 cells of the matrix.

Drill Activities. A rapid interaction of teacher question and pupil answer is indicated by the 4-8 and 8-4 cells.

Altogether, 38 measures were derived on the basis of past research, consultation with experts, and some pure "hunches."

As cited in Chapter 2, *Flanders' Interaction Analysis* has shown significant differentiation of teachers whose pupils learn more from those whose pupils learn less, and those whose pupils have more favorable classroom attitudes from those whose pupils have less favorable attitudes. Among the measures on which differences have been observed have been teacher acceptance of pupil ideas, use of criticism and direction, amount of teacher talk and pupil talk, and ratio of indirect to direct teacher behavior.

South Carolina Observation Record (SCOR). The individual items which made up SCOR (Figure 3) were obtained principally from two sources: the several revisions of the *Observation Schedule and Record* (OScAR), (Medley and Mitzel, 1958; and Medley, 1962), and Fowler's (1962) *Hostility-Affection Schedule*.

Figure 3

South Carolina Observation Record

Activities

Tot.	II	IV	(A) Teacher
			1. Uses a-v material
			2. Uses blackboard
			3. Leaves, enters rm.
			4. Moves freely
			5. Immobilizes pupils
			6. Leads singing, exercise, games

(A) Pupil	II	IV	Tot.
10. Seat work			
11. Leaves, enters rm.			
12. Moves freely			
13. One pupil central			
14. Gp. of pupils (2+) central			
15. Works at board, dec., cleans			
16. Speaks aloud w/o permission			
17. Pupil-pupil talk			

Teacher ______________________

Observer ______________________

Day ____________ Time ____________

Subject ______________________

Grade ______________________

No. Present ____ Date ____________

Methods

Tot.	II	IV	(M) Teacher
			1. Promises reward for good behav.
			2. Pleads or begs for good behav.
			3. Uses varied illustrations
			4. Interrupts pupil response
			5. Calls on non-volunteers
			6. Encourages further ans. (fact.)
			7. Encourages further explanations
			8. Enc. inter-relationships, generalizations, prob. solutions

(M) Pupil Answers

	II	IV	Tot.
10.			
11.			
12.			

Pupil Interest-Attention Rating Scale (Work Groups)

II	5	4	3	2	1
	Interest general and high	Most pupils interested much of time	About half interested much of time	Occasional pupils interested	Pupils gen. apathetic, uninterested
IV	5	4	3	2	1

Figure 3 (continued)

Hostility-Affection Schedule

This chart by Beverly D. Fowler is not available for publication at this time.

The items that were selected from the various revisions of OScAR were selected on two bases -- first, so as not to duplicate data which were already being collected by Flanders' Interaction Analysis, and second, insofar as possible, they were selected to be items of behavior which could be tallied as they occurred, rather than being rated. As an example, in the block of items on grouping, if the teacher has set up a committee of three pupils to work on a particular project, as this group is at work it would be represented as one tally under administrative, opposite two-three pupils. If, at the same time, six other pupils were working on a different assigned project, they would be tallied as an administrative grouping of more than three pupils but less than half the class. If this latter group stopped to whisper and giggle for a moment, for that moment they would become a social grouping, and would be tallied under social groupings, more than three pupils but less than half the class. As many groups as occurred during an observation period would be entered as tallies in the appropriate spaces on the blank.

The Hostility-Affection Schedule was used without modification. Fowler's rationale in developing it was to collect counts of behaviors in the classroom which seemed to represent affect, either positive or negative, verbal or nonverbal, expressed either by teacher or by a pupil. Each of these categories of behavior has a number of specific instances cited, but these are intended to be indicative rather than inclusive, and space is left at the end of each block for other behaviors to be added if they occur. Two additional thoughts entered into her development of the schedule: One thought was to provide means of recording behaviors by pupils which were supportive as well as those that were destructive; the other was that in the classroom in which there was negative affect but relatively high teacher control, the pupil expression of negative affect was more likely to appear in nonverbal form than in verbal; and that this might also be true of the "professional" teacher for whom verbal criticism of pupils was "unprofessional," but who felt need to express negative affect all the same. It was anticipated that pupil's behavior might be a better indication of the emotional climate of the classroom than the teacher's, and that this aspect of classroom behavior might be less likely to be influenced by the appearance of an observer.

Besides these two sets of items, a number of additional items were constructed which it was hoped might reflect other aspects of the emotional climate of the classroom or the tightness of control exercized by the teacher. These were, for example, the items of Teacher Central which reflected the fact that the teacher was "front and center" in the activities of the classroom; and Pupil Central, which meant that a pupil or a small group of pupils played the same role. Another example was the Pupil Interest-Attention rating which, although a rating, was somewhat more objective because it was based on a count of pupils in the classroom who appeared to be interested or involved in the ongoing activities.

Reduction of the data from SCOR began with an analysis of variance estimate of reliability calculated by a method suggested by Hoyt (1955). In this analysis, both occasions and observers were pooled in the estimate of error to obtain what Medley & Mitzel (1963) have identified as reliability. Since both inconsistency of classroom behavior and observer unreliability lower the value obtained, it is a minimum estimate. Items with reliabilities of .20 or higher were retained, since Medley & Mitzel, in the same reference, point out that the reliabilities of individual items of observation are likely to be low, but that reliability rises rapidly as items are pooled. Second year reliabilities, and the intercorrelations between the two years were also calculated and considered. It was part of the rationale of the project that reliability should not be a centrally important issue at this point, but that the major task of screening items should be done later in terms of their validity -- in this sense, their relation to change in pupils.

The items that survived this phase of the analysis were reduced by having all observations for each item pooled and these totals carried forward for use in further analysis.

Schedule of Observations. Observations were not scheduled ahead of time with the teachers, so that they did not know when an observer was coming (although the "grape-vine" probably let teachers know when observers were in the building). The observer would simply appear at the door, enter the room quietly, take a seat at the side where he could see both teacher and pupils easily, and begin recording. However, observations were scheduled by the supervisor of field data collection so as to insure that each observer saw each teacher once, and that each observation occurred at a different hour of the day and a different day of the week. These precautions seemed necessary because most teachers tended to follow a regular sequence of subject matters through the day, so that observing at different hours would ensure a representative coverage of the teaching of different subject matters. Scheduling of observation for different days of the week was based on the assumption that Monday and Friday were not likely to be like the other three days, and that systematic differences might exist among the other three days as well. The first year of the project there were six observations (17 or 18 minutes each) with IA, and five with SCOR (20 minutes each); the second year there were six observations with each.

Product Measures

Since the goal of the project was to assess change in pupils over a broad range of characteristics, a wide variety of measures were selected — subject matter achievement, personality, creativity, group skills, motivation and attitudes.

Iowa Tests of Basic Skills (ITBS). The vocabulary, reading, arithmetic concepts, and arithmetic problems (and arithmetic total) subtests of the ITBS were selected for use as measures of achievement in the project. This particular battery was selected because the subtests were long enough to produce adequately reliable scores for the individual measures and because the battery is more oriented toward skills than memory of particular facts (Lindquist and Hieronymus, 1956). These particular subtests were chosen because they represented very different skills -- those of vocabulary and reading being primarily verbal skills, and the arithmetic skills being primarily quantitative and minimally verbal. That is, these measures were judged to be both important and unique.

The administration of the tests was carried out by the field staff in all cases, according to standardized instructions. Scoring was done by the publisher's scoring service.

Children's Manifest Anxiety Scale (CMAS). The anxiety measure (A) employed was developed by Castaneda, McCandless, and Palermo (1956) by adaptation from the Taylor *Manifest Anxiety Scale*. The adaptation was done with fourth, fifth, and sixth grade children, but the items appeared to offer no difficulty to third grade pupils. It is made up of items such as, "I wish I could be very far from here;" "I get nervous when someone watches me work;" "I feel I have to be best in everything;" and "I worry about what is going to happen." In addition to the measure of anxiety, an eleven item scale intended to measure falsification and called the "lie" (L) scale was also included in the inventory. It was made up of such items as "I am always kind;" "I am always good;" "I tell the truth every single time;" and "I never get angry."

Further work by the same authors (Castaneda, Palermo, and McCandless, 1956) indicated that the A scale identified pupils who achieved differently in simple and complex learning in a laboratory situation. Since the differences were in the predicted direction, and in line with findings from the Taylor scale, the validity of the instrument was supported.

Reese (1961) found significant, but low, negative relationships between both A and L scales and a measure of achievement. Neither interacted with sex or grade level.

The Dependence-Proneness Scale (D-P). This is a 45 item inventory in which short statements are answered"Agree" or "Disagree" (Flanders, Anderson, and Amidon, 1961). Although their use was with eighth grade pupils, consultation with elementary school people indicated that it should be useable as low as second grade. Several items were reworded by substituting simpler words but only minor changes were made. The validity of the scale is supported by a number of studies: pupils who scored high on it (dependent) took less extreme positions on an opinionnaire than did low scoring pupils; pupils high in dependence-proneness achieved differently in the predicted direction in response to different teaching methods; and high and low groups from the scale differed significantly in dependent behavior in the classroom, as seeking support and approval from the teacher.

The Minnesota Tests of Creative Thinking. The original work was reported in Guilford (1957); Wilson, Guilford, and Christensen (1953); and Wilson, Guilford, Christensen and Lewis (1954). More recently, Torrance (1962) has revised these tests to make them usable at lower grade levels by individual oral administration, and has also developed additional tests which can be group-administered at any grade, kindergarten through graduate school.

Torrance (1959, a & b) modified Guilford's measures for use with grades four through six, resulting in tests of ideational fluency, spontaneous flexibility, originality, and cleverness. Correlation of tests from this battery with measures of achievement were significant and high; with Wechsler IQ, significant but low. The majority of relations with achievement remained significant after the effect of IQ was partialed out. A very satisfactory level of discriminating power appears to have been achieved, and interscorer reliability was reported to average .92 (Torrance, 1959a).

More recently, however, Edwards & Tyler (1965) and Ohnmacht (1966) have failed to find the degree of relationship between creativity and achievement reported by Torrance; and the existence of a general trait of creativity has been questioned on the basis of the low correlations of different creativity measures with each other (McNemar, 1964; Thorndike, 1962).

Despite these questions, however, these measures appear to be the best available for an important characteristic, and to warrant inclusion for further study. Four tasks were employed: two non-verbal, Circles and Figure Completion; and two verbal, Product Improvement and Unusual Uses, both employing a stuffed toy dog as the stimulus figure.

Scoring was carried out by instructions from the following sources: for Circles, Torrance (1962c); for Incomplete Figures, Torrance, Luthre, & Kennedy (1962); for Product Improvement and Unusual Uses, Yamamoto (1962). Scores for fluency, flexibility, originality, and elaboration were obtained for the two non-verbal tasks, and the first three of these for each of the verbal tasks, yielding a total of fourteen scores. In order to decide how to combine these, intercorrelations of the fourteen measures were calculated for a sample of a hundred pupils at the third grade and sixth grade levels and on this basis, as well as rational considerations, the eight non-verbal measures were consolidated into one measure, and the three measures from each of the verbal tasks were pooled into separate scores. Within each of these pooled subscores, measures were weighted so as to make them equally variable (Table 1), summed, and the mean calculated. The outcome, then, was a mean score for Nonverbal (NV), one for Unusual Uses (UU), and one for Product Improvement (PI).

Pupil Survey (Survey). The Survey is a measure of the interest or motivation the pupil feels for the work of the classroom (Cogan, 1956), which is obtained from an inventory of things he has done which were not assigned by the teacher but were related to classwork. Although the original Survey collected several kinds of pupil perceptions, only the Self-Initiated Work score was used in this project. Cogan's work with

Table 1

Constants Used in Weighting Subscores of

Minnesota Test of Creativity

Measure	Standard Deviation		$\bar{s}$	Constant
	Third Grade	Sixth Grade		
Incomplete Figures				
Fluency	2.04	2.19	2.12	4.72
Flexibility	1.87	1.98	1.93	5.18
Originality	4.33	4.44	4.39	2.28
Elaboration	8.89	9.43	9.16	1.09
Circles				
Fluency	4.42	5.36	4.89	2.04
Flexibility	3.36	4.70	4.03	2.48
Originality	4.05	4.73	4.39	2.28
Elaboration	7.02	8.86	7.94	1.26
Product Improvement				
Fluency	5.33	5.57	5.45	1.83
Flexibility	3.22	3.10	3.16	3.16
Originality	13.52	10.42	11.97	0.84
Unusual Uses				
Fluency	3.31	3.85	3.58	2.79
Flexibility	1.57	2.13	1.85	5.41
Originality	3.98	4.77	4.88	2.05

it showed low reliability for individuals, but a reliability of +.89 for groups. It also related in the predicted direction to the pupil's perceptions of the classroom methods of the teacher, as evidence of its validity. It is a twenty-five item scale including items such as, "I do extra things for this teacher," "I collect things for this subject," "I give extra reports," these are answered on a five-point scale ranging from "never" to "very often."

My Class. The measure of pupil attitude employed was the My Class inventory of Medley and Klein (1957). It is a forty-seven item inventory answered yes, no, or ?, by the pupil and was designed initially to have four scales. The first, called Halo, called for expression of the pupil's feelings about the class or the teacher. The other items were written so as to elicit behavioral perceptions rather than feelings. They were: a Disorder scale intended to measure the pupil's perception of the degree of disorder of the classroom; a Supportiveness scale intended to measure the pupil's perception of the emotional climate of the classroom; and a Traditionalism scale intended to discriminate between the "lock-step" classroom and a more permissive, democratic one.

A part of the rationale of the inventory was the expectation that responses to such an attitude scale might be determined to a considerable degree by the affective responses of the pupil to the classroom (hence the title, Halo). Analysis of the results of the inventory reported in the same reference indicated that the three behavioral scales were independent of the Halo scale, and that Disorder was independent of the other two, but that the Traditionalism and Supportiveness scales were not independent of each other; consequently they were pooled to make a single scale called Climate. The reliabilities of the scales were .89 for Halo, .83 for Disorder, and the reliability for Climate was described as low, but a quantitative measure was not reported.

The validity of the Disorder key was studied by relating it to relevant items from OScAR, and it was found to correlate .35, significant at the five per cent level. The empirical validities of the other scales remain unstudied, but content validity appears to be satisfactory.

Russell Sage Social Relations Test (RSSR). This is a test of the ability of a group to plan and carry out a cooperative group task (Damrin, 1959). It is structured in a way that makes it very difficult for a few individuals to assume responsibility for the whole group in the completion of the task, or for individuals to solve the problem without some kind of cooperative agreement. It is administered by a two-person team which assumes control of the classroom. One person serves as administrator and presents materials and leads the pupil planning, while the other serves as observer and categorizes, on a standardized observation schedule, numbers of aspects of the activity of the pupil group, including each statement made in the planning session. The materials that are used are 36 interlocking plastic blocks in three colors and two shapes, out of which three different figures can be constructed. The general procedure is one in which the observer (and the teacher, if she remains) sits at the back of the room, while the administrator works at a table or desk at the front of the room. The administrator initially instructs the pupils that this is a test in which they are to work together as a group and will receive a score as a group, then shows them the first figure and asks them what it is. When the pupils have identified it, they are then encouraged to plan how they can build it out of the materials which are distributed equally throughout the class. The administrator role in the planning session is specified in the same manner as that of the examiner in an individual intelligence test, although not in as completely standardized fashion. Essentially, the role is one of laissez-faire leadership, in which responsibility for the direction and control of the planning session is left to the pupil group. The administrator will provide the functions of maintaining order, asking questions to facilitate planning or to encourage participation, but only under specified conditions, and with these actions, in effect, scored against the group. When the group has developed a plan with which it is satisfied, the administrator steps aside and begins timing the construction phase (the planning phase has no time limit, and this is made clear to the pupils).

In the construction phase pupils face, sometimes for the first time under a particular teacher, a situation in which there is no adult control provided. The behaviors exhibited presumably reflect the degree of responsibility the pupils have learned to assume for their own behavior, and range from matter-of-fact, business-like progress with the task at hand, to wild, unrestrained running around the room, bickering and fighting. The materials in the task provide a highly motivating situation even for upper elementary grades, so that excitement usually runs high and a major part of the problem is one of responsible self-control in the group.

When the second problem is presented, the group has the opportunity to profit from the experience of the first problem. There are such possibilities as delegating the task to pupils with relevant skills, building portions of the problem at different locations so as to minimize crowding around the construction task and speed the building, and planning what pupils should do after completing their part of the construction task in order to minimize interference with those who are still working.

In the planning stage, the observer records the proportion of pupils who appear to be involved in the activity at each of several stages, the nature of the plans proposed, whether the plans build on earlier plans, and the extent to which administrator leadership is required by the group. In the operations stage there is systematic recording of the proportion of involved pupils, the social-emotional climate of the work group, and the kinds of activities carried out by pupils who have left the construction task.

The test is scored on ten dimensions of the group's activities following general rules of procedure outlined in the manual. However the results of these ten dimensions were pooled to provide an over-all estimate of the performance of the group using empirical weights developed by Medley and Mitzel by scaling by reciprocal averages (private communications). In earlier research (Bowers and Soar, 1961) the reliability of this pooled score was estimated to be .82; (Hoyt 1955); the intercorrelations between the three problems were about .90. In the light of this high interprobler correlation, only problems one and two were administered in the current study.

Since a number of the original ten scoring dimensions seemed of interest in themselves, the intercorrelations of all ten were calculated between problems one and two; but only Activity, the rating of constructiveness of behavior of uninvolved pupils in the operation phase, seemed high enough to examine separately from the Total score. In the earlier research cited above, Total score was found to correlate .70 with grade level, so this relationship was calculated for these data. Correlations of .36 the first year and .37 the second were obtained, which was not surprising since only grades three through six were involved as compared with grades one through six in the earlier study. Since the Correlation was still significant, however, the Total score was adjusted statistically to eliminate the effect of grade level.

Sensitivity Training

Rationale of the Training Laboratory

From the goals of education cited earlier, some of the necessary teacher skills and understandings for working with pupil groups can be developed. Among them are:

Understanding. It is important that the teacher understand the difference between laissez-faire and democratic leadership. The absence of autocratic procedures is often thought to be democratic, but actually it is laissez-faire. Much of the anarchy attributed to democratic procedures should rather be attributed to laissez-faire procedures. A teacher should understand the forces at work in a group which determine its effectiveness -- the leadership and membership functions which must be provided for task progress and group maintenance, and conversely the negative influences which disrupt the work of the group. The teacher must understand the necessity for pupils to make decisions in order to gain skill in making decisions, and to be free of teacher authority in order to learn to take responsibility for themselves.

Skills. As a teacher must understand the forces and functions important in group effectiveness, she must be confident of her own ability to provide leadership that develops pupil skills rather than supplanting them. In order to gain these skills for herself, she must have the opportunity to practice them in a "psychologically safe" environment. In order to use these skills, she must have skill in diagnosing what functions are needed in a group.

Sensitivity. It is important that the teacher be aware of the influence she exerts on the pupil group, that she be aware of the feelings and emotions present in herself and those with whom she works, as important elements determining group effectiveness. In addition, it is important that she become sensitive to her own "feedback" -- to become aware of the consequences of her behavior at the same time she participates.

It is a tenet of this kind of training that change in behavior is likely to take place only on the basis of experience. To talk about behavior is not enough; one must behave, and then evaluate the consequence. Hopefully this will provide a model for the teacher in her classroom. As she has learned from her own experience, she may learn to teach her pupils through the medium of their experience.

It also seems likely that the rewards of working with others in a self-directing group may provide the teacher with an awareness of the motivation which can be created by the experience of working with others. This is the motivation which may be capitalized on for pupil learning in the classroom in the same way the other learnings may be transferred from the training laboratory to the classroom.

In summary, this is training which is expected to foster increase in understanding and skill in working in groups and in social relationships with others. But it should also offer insight into effective means of organizing for work in the classroom and utilizing the rewards and motivations that come from satisfying working relationships with others.

Procedures Used in the Training

The laboratory was held over a period of three weeks,with sessions each morning lasting from four to four and a half hours. The setting was a University adult education center in the same city in which the schools in the study were located, so that the teachers returned to home and family each afternoon, rather than being residents on a "cultural island."

The activities in which the teachers were involved were:

Theory Session. This was a relatively traditional lecture and discussion presentation designed to provide a cognitive frame of reference within which to integrate the other learnings, or to supply theory or research findings relative to group functioning. Typically, thirty to forty-five minutes were spent in this activity daily.

Training (T) Group. This was an unstructured, process-oriented discussion group, in which group members had the opportunity to discover in the microcosm of their experience together a variety of the problems faced in most groups, and to develop procedures and controls for themselves, as needed. The role of the staff member in this phase of the training was that of process observer who attempted to help the group understand what it was doing, to raise questions about sources of difficulty, but to take no leadership responsibility, in order to leave that function to be provided by group members. Two hours a day were devoted to this activity.

Skill Practice. This phase of the laboratory consisted of a number of structured exercises, or problems set for the group to work on, calculated to produce particular phenomena for analysis, or to provide opportunity for group members to experiment with new behavior in a setting which was "psychologically safe" and in which feedback was available. Role-playing, group discussion, and directed observation with sharing of perceptions were the central activities. Frequently, the theory sessions and skill practice exercises were integrated so that the theory set the stage for the skill session, or was developed in relation to the results of a skill session. Since the same small group had all three experiences together, this integration of activities was more easily accomplished than in larger laboratories. Theory and skill sessions toegther made up approximately a two to two and a half hour block of time.

Among the topics dealt with were a number concerning communication: one-way vs. two-way, the effect of the communication network, hidden agendas, listening skills, increasing awareness of one's own feelings and the feelings of others. Other topics included the effect of clear vs. unclear goals in the group, effects of group cohesiveness, functions of leadership and membership, force-field analysis, and group problem-solving.

Training of the School Principals

During the same period of time in which the teachers were engaged in their training laboratory, the principals of the four schools attended an Educator's Laboratory presented by the National Training Laboratories, in

Bethel, Maine. As was suggested in Chapter 2, the training of the principals was part of the attempt to provide more support for teachers in their application of the learning from their training to their classrooms. In a sense, the fact that the effects of the principals' training were available to both experimental and control groups of teachers appears to be "stacking the deck" against finding greater increase in skill for the trained teachers. But one of the questions of interest was whether more of the teachers would profit from the sensitivity training than the number (approximately half) that did profit in the earlier study (Bowers and Soar, 1961). A related question is whether as large a proportion of teachers would appear to become less capable as a consequence of the training experience. Presumably, the principals' training should increase the proportion of teachers who would be able to make positive transfer of the laboratory learnings to their classrooms. And it does not seem out of the question that the principals' training might have a kind of multiplicative effect on the ability of the teachers to apply these laboratory learnings to the classroom.

Analysis of Data

Analysis of the data involved five major phases, with a number of steps in each.

1. The product data were processed by calculating residual true gain scores in which the effects of regression and of initial standing were eliminated.
2. The process data were factor analyzed twice to identify successively smaller numbers of measures and to calculate factor scores descriptive of classroom process.

3. The relations between process and product measures were studied by correlating process factor scores with classroom means for the product measures, by analysis of variance, and by factor analyzing both sets of measures together.

4. The concurrent validity of the presage measures was studied by relating them to measures of teacher effectiveness defined by factor scores from the process-product factor analysis.

5. The experimental training experience offered a subgroup of the teachers was evaluated by analysis of variance of change in the latter factor scores for the two years of the project.

Product Data

Measures of Pupil Change. Since one of the questions of principal interest in the project was that of evaluating the effect of classroom process on the growth of pupils, data collection was planned to make this possible. Measures of status in subject matter achievement, personality, creativity and group skills were administered at the beginning and end of the first school year and at the end of the second year, in order to measure the growth occurring during each of the two years.

Need for Measures of Change. An alternative to change scores and perhaps the more frequent procedure, is to study the status of pupils at the end of the year, and to assume that differences found at that point are attributable to differences in the classroom process of the current school year. But unless the experimenter is able to assign pupils to classrooms by a procedure which assures randomness, the most likely assumption would seem to be that there will be systematic influences in the assignment of pupils to teachers which may be reflected, still, in year-end status.

It seems probable that this effect would be most contaminating for standardized achievement tests which attempt to measure broad educational goals. Other characteristics, such as personality or creativity, assumed to develop over extended periods of time, might also be expected to be affected. On the other hand, probably status scores of knowledge of the material of a particular unit of study would be affected little if at all.

If attainment of broad achievement goals, or other long-term devemopmental characteristics, are to be studied in relation to classroom process, it seems essential to control initial levels by randomization; or next best, to study change during the year.

Problems in Measuring Change. The use of measures of change, while in theory a straightforward way of studying the effect of classroom process on pupils, in practice turns out to have a number of very real difficulties. The principle one is that change measures are much less reliable than the measures of status from which they are derived. As Thorndike (1966) has pointed out, much of what determines the status of a person at the time a test is administered will be common to another test administered a year later. When the difference between these two measures is taken, the stable element is removed from both, and the remainder, the measure of change, is then much less reliable. Furthermore, as several authors have pointed out, (Thorndike, 1966; Lord, 1962, for example) the unreliability of the change measure introduces a spurious negative correlation between the measure of change and the initial status measure. That is, the pupil who initially stands low on a measure of vocabulary is likely to show growth which is spuriously great; and pupil who stands high on this same initial measure will show a change measure which is spuriously low; and the greater the unreliability, the greater the spurious relationship.

Procedure for Measuring Change. Lord (1962) has proposed a procedure for estimating the extent of this spurious relationship, and of estimating measures of growth from which this spurious element has been removed. This procedure was applied to all of the measures on which pupil data were obtained at the beginning and end of the first project year and at the end of the second project year. Estimates of true gain were calculated for each pupil for each of the eleven measures: five achievement measures from the ITBS, Anxiety and L from the CMAS, Dependence-Proneness, and the three scores from the Minnesota Tests of Creative Thinking. Scores for the group problem-solving test were similarly treated for the first project year, but status scores were used at the end of the second year, since the pupil groups were rearranged.

Following this, the relation of initial standing to estimated true gain was calculated for each measure; the regression was used to estimate the gain which would have been anticipated on the basis of the initial score; and the difference between these two measures was taken as an estimate of residual gain (Webster 1958, 1959).

The purpose of these two procedures was to obtain as unbiased a measure of pupil change as possible, and one which would minimize the effect of the initial status of the pupil, so as to produce measures which would reflect more clearly the influence of the classroom on the pupil. Since the relationships involved differed somewhat from grade level to grade level, both the estimation of true gain and the adjustment for initial standing were carried out separately for each grade level, for each of the two years.

In addition to these estimates of residual true gain for each of the two years, an additional set of estimates was made for those pupils for whom scores were available at the beginning of the second project year -- the group of entering sixth graders in three schools in which the same achievement tests were used as part of the school system testing program. In this case, the same procedures were followed to estimate residual true gain for the summer, and this estimate was then subtracted from the residual true gain score which had been calculated from the spring of the first project year to the spring of the second project year. For this group, then, residual true gain scores were available for the first academic year, for the summer following, and for the second academic year of the project. These were in addition to the measures available for all other pupils in which the first year residual true gain was from fall until spring, and the second year residual true gain was from spring of the first year to spring of the second year.

The total score on the Russel Sage Social Relations Test had been found in two earlier projects to be related to grade level (Bowers and Soar, 1961; Soar, 1962), so the relation of this residual gain score to grade level (.36 the first year, and .37 the second) was extracted statistically. Since the RSSR is a test in which the classroom as a whole is scored rather than individual pupils, the numbers of cases were too small to calculate residual gain scores separately by grade level.

Measures of Pupil Status. Because the measures of attitude, motivation, and perceptions of the classroom presumably referred to the particular classroom to which the child was assigned, they were only administered at the end of each year, and were used as status measures, only. Although the assumption that only this classroom was reflected in the measures may not be entirely defensible, it did not seem appropriate in the fall to ask pupils their reactions to a classroom which they had only recently entered, in order to obtain measures of change.

Process Data

Initial Screening. The forty-nine measures initially derived from SCOR and from IA are listed in Chapter 4, Results, for ease in interpreting tables. The first step in the analysis to begin the "weeding out" of measures was to subject this initial series of measures to a principal components factor analysis, with varimax rotation. On the basis of this analysis, and also on the basis of the intercorrelation table, twenty measures were eliminated as overlapping. In order to clarify some questions which were raised in attempting to interpret this first analysis, and in order to represent some new "hunches," an additional ten measures were derived from the IA matrices, added to the twenty-nine which had survived the first "weeding-out" process, and the resulting thirty-nine measures re-factor analyzed.

Calculation of Factor Scores. Factor analysis was used as a way of identifying clusters of classroom process measures that tended to go together on the basis of a common dimension or factor. Since the goal was to identify the position of each of the classrooms on each of the dimensions, factor scores were calculated. A nine factor rotation was chosen as the clearest representation of the measures, even though the commonly used criterion of using eigen values of one or larger would have selected ten factors for rotation.

In the light of the large number of measures involved (39), and the small number of subjects (55), it seemed that the conservative procedure would be not to employ a least squares procedure which would fit error as well as valid variance. As a consequence, two incomplete methods were employed -- those discussed by Horn (1965) as methods six and seven. The latter is the procedure identified by Trites and Sells (1955) as unit weighted factor scores. In order to employ these two methods, each of the thirty-nine measures for the 55 teachers was first converted to a T score by area transformation. This had the effect of making the distribution for each measure normal, and making all of the measures equally variable.

In carrying out both procedures for obtaining factor scores, measures were used which had loadings of .5 or higher on a given factor. For method six, for each measure which had a loading of .5 or higher on a given factor, the normalized T score for each teacher was multiplied by the factor loading as a weight, retaining the sign for bipolar factors, and these weighted scores were then summed for each factor. For method seven, the T scores for measures which had this minimum loading on the given factor were simply added together without weighting, retaining the sign for bipolar factors. When the results of these two analyses were compared, however, it was found that the weighted and unweighted factor scores correlated at least .99 with each other, so only the unweighted factor scores were retained for use in further analyses.

The effect of this procedure was to isolate statistically sets of measures of classroom process which clustered together on nine dimensions. Then a score was calculated for each classroom for each of these dimensions. The purpose was to develop a series of measures which would describe the process aspects of each classroom, so they could be studied in relation to the changes in pupils in those classrooms for the year.

Relations Between Process and Product Measures

Relations between process and product measures were examined on the basis of two kinds of rationales: one based on theory and previous research; the other entirely empirical.

Theoretical Analyses. Much of educational theory, as cited in Chapter 1, has stressed the importance of the social relationships (in the broad sense of the term) to the work of the classroom. Terms such as "permissive," "democratic" and "warm" are common.

Past research in the area of group affectiveness (Fleishman, 1953) has identified two dimensions along which task groups of various sorts differentiate. The dimensions were "Initiating Structure," which represented the degree to which the leader assumed responsibility for the direction of the group, and "Consideration," which represented the supportiveness of the relationships between group members.

It is not hard to see these two dimensions implied in such a term as "permissive," and the terms "democratic" and "warm" seem each to imply a position on one of the two dimensions.

In line with this thinking, two factors were sought from the first factor analysis which best represented these two dimensions of group behavior. The dimension of Indirect to Direct teacher behavior seemed the closest parallel to the first of these, and a dimension of hostility expression the clearest parallel to the second. The terms "control" and "climate" were applied.

The control dimension was measured by the Revised I/D Ratio for Rows 8 and 9 of the Interaction Analysis, which is made up of teacher behaviors which occur immediately after a pupil stops talking, omitting questions and lecturing. Such responses as praise or encouragement, accepting feeling, or accepting or using a student idea are identified as indirect -- that is, they have the effect of expanding pupil freedom. Those of criticism, justification of authority and giving directions are classed as direct teacher behavior in that they tend to limit pupil freedom.

The climate dimension was composed of these items from SCOR: Pupil Non-Verbal and Verbal Hostility, and Teacher Verbal Hostility; and from Flanders' IA, Prolonged Criticism (Steady State 7-7). Using these two dimensions of control and climate, four classrooms were then selected for study from each grade level, representing the extreme combinations of conditions: that is, direct control, high hostility; direct control, low hostility; indirect control, high hostility; and indirect control, low hostility. Altogether, then, sixteen classrooms were selected for a 2x2x4 factorial analysis of variance -- two levels of control, two levels of climate, and four grade levels, three through six.

Residual true gain scores for the pupils in the sixteen classrooms were used as the measures for analysis for Vocabulary and Reading. For the creativity measures, which were analyzed earlier, true gain measures were used.

Similarly, four extreme classrooms for which residual true gain scores were available for the summer were selected in order to study summer gain in relation to the classroom process of the preceding year.

Empirical Analyses.

Correlation of Process Factor Scores with Classroom Product Means. Since both factor analyses of the process measures had produced a number of factors which had no counterpart in theory, the relationships of all of the factors from the second analysis to all of the product measures were analyzed. In order to do this, the mean was calculated for each pupil measure for each classroom, and these means were correlated with the factor scores based on the second factor analysis of the process measures for the classroom.

To examine the possibility that these relationships might differ for various subgroups of pupils, subgroups were selected on the basis of sex, and (based on a median split) high and low anxiety, high and low L, and high and low dependency. The matrix of intercorrelations was then rerun for each subgroup. If, then, girls, high-anxious pupils, or dependent pupils should be more (or less) sensitive to classroom process, presumably this should be reflected in differing intercorrelations between the factor scores and the means of classroom change for the subgroups.

Relation of Process and Product Measures over Two Years. Still another set of analyses was carried out by analysis of variance to determine the relative effect of two years of exposure to a given classroom climate variable for pupil groups. In order to accomplish this, four process factors which had correlated with pupil gain in the earlier analysis were selected.

On the basis of these factor scores, teachers were identified who were in the top, middle and bottom third on each of the four factors for the first year. In similar fashion, teachers from the top, middle and bottom third were identified for each factor for the second year. Then pupils were identified who had had the nine possible combinations of classroom conditions from the first to the second year, for each factor. For example, pupils were classified into those who had had classrooms high on Factor 1, Teacher Criticism, the first year, and high on Teacher Criticism the second year, those who had had a classroom low on criticism the first year and low on criticism the second year, and a cross combination of these as well -- high to low, and low to high and the various combinations involving the middle category.

The result was a 3x3 analysis of variance, in which the rows were the three levels of the factor for the first year, and the columns were the three levels for the second year. The smallest cell frequency was identified, and cases were discarded randomly from all the others to obtain equal frequencies for the cells of the analysis.

Again, the measure under analysis was pupil change, but this time, of course, the relative influences of two years were under study, rather than just one as in the preceding analyses. The principle question at issue was whether something other than a simple additive effect of a particular classroom condition over two years took place. Among the possibilities were: that a pupil might become "adapted" to criticism on the part of the teacher, so that the debilitating effect of one year of teacher criticism "washed out" to some degree the second year. The reverse of this also seemed possible, that pupils might become sensitized by teacher criticism, so that a second year would be even more debilitating.

If either of these effects tended to occur, then a significant interaction term should be found in the analysis of variance. Cross combinations also appeared to be of interest, enabling the examination of such questions as: does the negative effect of one year of high teacher criticism carry over to the second year, even when a pupil is in a classroom in which teacher criticism is low? Or is each year a year largely unto itself? Similarly, does having had a year in a supportive classroom enable a pupil to withstand the negative effects of a classroom high in teacher criticism better than if he had had a critical classroom the year before?

To answer questions such as these, five analyses of variance were calculated for each of the four factors: for Vocabulary, Arithmetic Concepts, Anxiety, L, and Product Improvement.

Factor Analysis of Process and Product Measures. As another way of examining the relationships between teacher-pupil classroom behavior and change in pupils, and also as a step toward defining teacher effectiveness in terms both of classroom process and of pupil change, a third factor analysis was run, this time including both the process measures and the classroom mean product measures. The number of measures was reduced by carrying forward only the two measures which loaded most heavily on each of the factors in the second factor analysis. For bipolar factors the two measures loading most heavily at each end of the factor were carried forward. In addition, Arithmetic Total was eliminated from the product measures as overlapping with Problems and Concepts, and My Class

Climate was eliminated because of its bi-valent nature. The number of measures which remained was then thirty-nine, twenty-four process measures and fifteen product measures.

The Relation of Presage Measures to Process and Product Measures of Teacher Effectiveness

Following the rationale that the important measures of teacher process are those which relate to pupil change, factor scores from the simultaneous analysis of product and process measures were used as the measures which were intercorrelated with the teacher presage measures collected in the project. The general scheme was one of working backward from pupil change -- identifying measures of classroom process which related to pupil change, and then, in turn, identifying characteristics of teachers which related to classroom process which related to pupil change. The many negative results which have been produced by studies based on a priori or theoretical assumptions about important teacher behavior seem to argue for some empirical analysis.

Evaluation of Sensitivity Training for the Teachers

Part of the study involved a group development training laboratory offered a subgroup of the teachers in the project. Altogether, seventeen teachers participated in this laboratory, but of these, three failed to complete a second year of teaching, so that the group on which complete data were available was limited to fourteen. Of the teachers who did not take part in the training experience, thirty-one remained through the second year so that complete data were available for them, making a total of forty-five. The criteria of teacher effectiveness which were employed in this analysis were four sets of factor scores derived from the analysis which included both product and process measures. The factors were selected to include both process and product measures, and to include product measures representing change in achievement, personality and creativity. This was done in order to avoid the necessity of defining "good" teaching in a priori fashion, thus avoiding the difficulties of reaching agreement on what "good" teaching behavior is. It also appeared to have the advantage of identifying for analysis those aspects of classroom process which were associated with change in pupils. Probably research in education is not yet at the stage where it can be restricted only to classroom processes which are known to promote change in pupils, but study of these processes would seem to be especially important.

The method of analysis originally planned for these data was the Johnson-Neyman technique (Johnson and Jackson, 1959). At the time the project was initiated, this analysis was available from the same computer center which had calculated it for an earlier project (Bowers and Soar, 1961). However, during the course of the project, change of both personnel and equipment at that center resulted in the analysis becoming unavailable.

The distinguishing feature of the Johnson-Neyman analysis is that it permits different regressions of posttest performance, or change in performance, on pretest scores for the experimental and control groups. These differences in regression were found in the study cited earlier to be typical in comparisons made between the experimental and control group; and had, in fact, been anticipated both on the basis of personality theory, and on the basis of clinical observation of groups in training.

The effect was that teachers whose psychic resources were limited, as indicated by several scales on the MMPI, failed to profit from the training experience, while teachers whose resources were greater did profit, often markedly. Not only did the former subgroup of teachers fail to profit, but some of them became less effective teachers after the training experience than they had been before. This tendency for subgroups to move in opposite directions on the criterion measures made the differences between experimental and control groups insignificant when tested by analysis of covariance. But when subgroups which tended to move in opposite directions as a consequence of the training experience were identified on the basis of personality by the Johnson-Neyman analysis, highly significant differences were found.

In order to answer the major questions which the Johnson-Neyman analysis would have answered, an analysis of variance of change in effectiveness was calculated separately for four of the factors under study. Change in factor score from the first to the second year was taken as the measure of change in effectiveness; using factor scores derived from the analysis which included both process and product measures, and calculated by the same procedure as the factor scores for classroom process. True gain could not be estimated, since reliabilities did not exist for the factor scores. The adjustment for initial standing was carried out in the same manner as the true gain product measures; namely, the regression of change on initial standing was used to predict change, and the difference between predicted and observed change was used as the measure for further analysis. Then, rather than calculating the regression of change on the personality score separately for the experimental and control groups as the Johnson-Neyman analysis would have done, the personality scale was used as the basis on which subjects were divided into three blocks as evenly as possible. The result was a 2x3 analysis of variance with experimental-control groups one factor, and the three levels of the personality measure the other factor. If then, the effect of the treatment, sensitivity training, should differ at different levels of personality, the effect should appear in the interaction term of the analysis. The regions of significance which the Johnson-Neyman analysis would have produced were not available, but the possibility of differential effect of the training was tested.

The MMPI keys used in the analyses were Pd, Sc, Pt, and R, selected on the basis of previous research. These measures, in combination with the four factors cited earlier, produced twenty analyses, altogether.

Summary

In general, the study had a major phase and a minor phase. In the major phase, product data were reduced to measures of change in pupils, the measures of change in pupils were related by several analyses to measures of classroom process, and both of these in turn were related to teacher presage measures. In the minor phase, the measures of process and products developed in the major phase, for the two years of the project, were used as the criterion measures to assess teacher change following sensitivity training.

In the major phase, pupils were followed for two years permitting teachers to vary; in the minor phase, teachers were followed for two years permitting pupils to vary.

Chapter 4

Results and Discussion

The presentation of results, in general, will follow the same sequence of topics presented in Chapter 3, Procedure. However, since there were a number of studies within the total study, each set of results will be discussed immediately after it has been presented. For the same reason, brief comments about procedure will be included at the beginning of some sections on results to aid in interpretation.

Product Measures

Means and Standard Deviations

The means and standard deviations for the product measures for the fall and spring of the first year are presented in Tables 2 through 5. Several things seem worthy of notice. In general, the pupils represented here are an advanced group. For the verbal tests, for example, the various pupil subgroups ranged from approximately six months to a full year advanced at the beginning of the school year. The quantitative tests are not as far advanced, but in each case they are clearly ahead of grade level expectation.

An additional point that will be of some interest later in the section on Pupil Change During the Summer is that if one examines the spring results for a grade level and the fall results for the next higher grade level, there is no evidence in these data of pupil loss of achievement during the summer months. For example, for the verbal tests the third graders ended in the spring with an average of 45 and a fraction grade level months, while the fourth graders had begun at 46

Table 2

Means and Standard Deviations for Product Measures for Third Grade Pupils for the First Project Year*

Measure	Fall, 1962		Spring, 1963	
	Mean	Standard Deviation	Mean	Standard Deviation
Iowa Tests of Basic Skills				
Vocabulary	38.79	9.78	45.73	10.50
Reading	38.31	10.00	45.07	13.24
Arithmetic Concepts	37.43	8.81	43.46	9.33
Arithmetic Problems	33.16	6.78	41.51	8.79
Arithmetic Total	35.30	7.03	42.49	8.46
Children's Manifest Anxiety Scale				
Anxiety	21.49	8.30	21.10	8.68
L	4.76	2.26	4.02	2.32
Dependence-Proneness	27.40	4.80	27.35	4.87
Minnesota Tests of Creativity				
Non-Verbal	25.62	5.40	28.80	4.98
Product Improvement	12.63	7.65	20.01	10.15
Unusual Uses	8.94	7.55	15.40	11.09
Pupil Survey			57.28	19.62
My Class				
Halo			6.32	1.62
Disorder			15.81	2.68
Climate			21.44	2.63

*N = 398

Table 3

Means and Standard Deviations for Product Measures for Fourth Grade Pupils for the First Project Year*

Measure	Fall, 1962		Spring, 1963	
	Mean	Standard Deviation	Mean	Standard Deviation
Iowa Tests of Basic Skills				
Vocabulary	46.35	10.34	53.02	12.18
Reading	46.90	13.07	50.47	13.09
Arithmetic Concepts	44.89	8.51	51.16	8.26
Arithmetic Problems	43.92	7.74	49.46	10.34
Arithmetic Total	44.39	7.63	50.29	8.65
Children's Manifest Anxiety Scale				
Anxiety	19.77	7.53	20.50	8.28
L	3.85	2.35	2.90	2.15
Dependence-Proneness	27.45	4.54	26.60	5.12
Minnesota Tests of Creativity				
Non-Verbal	26.58	5.15	30.92	5.44
Product Improvement	17.32	8.73	25.90	11.93
Unusual Uses	12.88	8.92	18.59	13.08
Pupil Survey			56.69	18.73
My Class				
Halo			5.89	1.85
Disorder			17.01	2.19
Climate			21.90	2.45

*N = 358

Table 4

Means and Standard Deviations for Product Measures for Fifth Grade Pupils for the First Project Year*

Measure	Fall, 1962		Spring, 1963	
	Mean	Standard Deviation	Mean	Standard Deviation
Iowa Tests of Basic Skills				
Vocabulary	60.01	14.47	67.80	16.26
Reading	60.11	14.71	66.29	17.88
Arithmetic Concepts	55.97	7.61	62.62	8.63
Arithmetic Problems	55.01	9.08	61.79	11.61
Arithmetic Total	55.49	7.61	62.19	9.41
Children's Manifest Anxiety Scale				
Anxiety	20.24	7.25	19.82	7.84
L	3.12	2.14	2.40	1.96
Dependence-Proneness	27.28	4.48	26.93	5.32
Minnesota Tests of Creativity				
Non-Verbal	28.02	5.71	31.14	5.36
Product Improvement	19.32	8.99	26.09	12.22
Unusual Uses	18.24	12.24	23.18	16.31
Pupil Survey			54.61	19.44
My Class				
Halo			5.87	1.91
Disorder			16.77	2.67
Climate			21.27	2.19

*N = 353

Table 5

Means and Standard Deviations for Product Measures for Sixth Grade Pupils for the First Project Year*

Measure	Fall, 1962		Spring, 1963	
	Mean	Standard Deviation	Mean	Standard Deviation
Iowa Tests of Basic Skills				
Vocabulary	69.43	15.28	77.40	16.72
Reading	68.81	13.23	74.41	14.56
Arithmetic Concepts	65.39	8.42	73.48	9.62
Arithmetic Problems	64.85	9.30	72.29	12.71
Arithmetic Total	65.11	8.15	72.87	10.43
Children's Manifest Anxiety Scale				
Anxiety	18.74	7.55	17.72	8.05
L	2.64	2.13	2.21	2.09
Dependence-Proneness	28.08	4.44	27.06	5.15
Minnesota Tests of Creativity				
Non-Verbal	28.29	6.39	30.90	5.89
Product Improvement	22.53	9.89	27.93	11.68
Unusual Uses	19.44	11.59	27.03	16.87
Pupil Survey			58.99	17.54
My Class				
Halo			5.59	2.12
Disorder			16.49	2.81
Climate			21.23	2.39

*N = 380

and a fraction grade level months. These were different groups of pupils (third and fourth graders tested at the same times), but it would be surprising if selective influences operated to increase grade level standing so sharply for three successive years in four elementary schools. From ending fourth graders to beginning fifth graders, there was an increase of seven to ten months, whereas from ending fifth graders to beginning sixth graders there was an increase of one to two months. These results are for the verbal tests. Although the differences are smaller, the same kind of trend can be seen for the quantitative measures.

The means and standard deviations for the second year are presented in Tables 6 through 9. Similar trends will be seen in these tables, except that the growth shown is generally somewhat greater than in the first year data, and this is apparently associated with the fact that a full calendar year of growth is represented rather than an academic year of growth, which was actually more like seven months.

In general, then, the pupils in the project were an above average group, and the data appeared to show no evidence of a summer "slump."

From the Children's Manifest Anxiety Scale, the measure of A and L were very similar at the beginning and end of the first project year for each grade level, but the A score showed a drop of approximately a half standard deviation at the end of the second project year at each grade level. The Dependence-Proneness scale appeared to produce very similar results at all grade levels for both years.

The first year Minnesota Tests of Creativity showed growth for every measure for every school year, with no evidence of the "fourth grade

Table 6

Means and Standard Deviations for Product Measures for Third Grade Pupils for the Second Project Year*

	Spring, 1963		Spring, 1964	
	Second Grade		Third Grade	
Measure	Mean	Standard Deviation	Mean	Standard Deviation
Iowa Tests of Basic Skills				
Vocabulary	35.2	8.81	44.0	10.54
Reading	33.9	9.12	43.1	12.83
Arithmetic Concepts	33.9	8.16	42.9	9.45
Arithmetic Problems	31.5	6.66	40.6	8.79
Arithmetic Total	32.7	6.70	41.7	8.54
Children's Manifest Anxiety Scale				
Anxiety	19.7	8.16	16.4	9.68
L	5.4	2.06	4.8	2.42
Dependence-Proneness	27.1	4.47	28.0	5.07
Minnesota Tests of Creativity				
Non-Verbal	24.2	4.95	29.4	5.24
Product Improvement	13.6	7.56	18.4	9.50
Unusual Uses	10.8	6.61	16.8	10.87
Pupil Survey			63.5	22.34
My Class				
Disorder			14.4	3.19
Climate			21.2	3.37

*N =327

Table 7

Means and Standard Deviations for Product Measures for Fourth Grade Pupils for the Second Project Year*

	Spring, 1963		Spring, 1964	
	Third Grade		Fourth Grade	
Measure	Mean	Standard Deviation	Mean	Standard Deviation
Iowa Tests of Basic Skills				
Vocabulary	46.0	10.62	55.3	13.13
Reading	45.2	13.23	54.9	15.72
Arithmetic Concepts	43.4	9.29	51.4	8.47
Arithmetic Problems	41.3	8.82	51.7	9.84
Arithmetic Total	42.4	8.42	51.5	8.45
Children's Manifest Anxiety Scale				
Anxiety	20.6	8.66	16.2	9.31
L	4.1	2.27	3.7	2.33
Dependence-Proneness	27.7	4.87	27.7	4.49
Minnesota Tests of Creativity				
Non-Verbal	28.9	4.91	29.1	4.67
Product Improvement	19.7	10.18	22.1	9.36
Unusual Uses	15.4	10.54	19.7	11.43
Pupil Survey			59.9	18.45
My Class				
Disorder			14.9	2.88
Climate			22.0	2.34

*N = 302

Table 8

Means and Standard Deviations for Product Measures for Fifth Grade Pupils for the Second Project Year*

	Spring, 1963		Spring, 1964	
	Fourth Grade		Fifth Grade	
Measure	Mean	Standard Deviation	Mean	Standard Deviation
Iowa Tests of Basic Skills				
Vocabulary	53.4	12.47	64.6	15.91
Reading	50.9	13.26	62.4	16.33
Arithmetic Concepts	51.3	8.16	60.7	9.34
Arithmetic Problems	49.6	10.12	59.1	11.44
Arithmetic Total	50.4	8.46	59.9	9.69
Children's Manifest Anxiety Scale				
Anxiety	20.1	8.34	14.8	9.43
L	2.8	2.11	3.1	2.17
Dependence-Proneness	26.7	4.72	28.4	4.42
Minnesota Tests of Creativity				
Non-Verbal	30.8	5.57	30.4	5.31
Product Improvement	25.9	11.92	23.9	10.21
Unusual Uses	18.9	13.43	23.9	14.06
Pupil Survey			62.3	17.68
My Class				
Disorder			15.2	2.96
Climate			21.5	2.23

*N = 263

Table 9

Means and Standard Deviations for Product Measures for Sixth Grade Pupils for the Second Project Year*

	Spring, 1963		Spring, 1964	
	Fifth Grade		Sixth Grade	
Measure	Mean	Standard Deviation	Mean	Standard Deviation
Iowa Tests of Basic Skills				
Vocabulary	68.9	15.81	79.8	16.75
Reading	67.0	17.57	76.9	15.85
Arithmetic Concepts	63.0	8.59	73.4	10.23
Arithmetic Problems	62.4	11.59	74.5	13.69
Arithmetic Total	62.7	9.37	74.0	11.24
Children's Manifest Anxiety Scale				
Anxiety	19.3	7.94	14.3	7.88
L	2.4	2.02	2.3	2.05
Dependence-Proneness	27.1	5.32	28.2	5.31
Minnesota Tests of Creativity				
Non-Verbal	31.0	5.26	31.2	5.10
Product Improvement	25.9	11.76	25.0	9.76
Unusual Uses	23.4	15.90	27.2	15.74
Pupil Survey			63.0	18.61
My Class				
Disorder			15.3	2.80
Climate			21.4	2.56

*N = 264

slump" which Torrance (1962b) has discussed. However, the fourth grade began at a lower level than the ending third grade, and the same pattern was true for the higher grades, suggesting the possibility of practice effect for what was almost certainly a novel form of test for these pupils. There was no evidence of a fourth grade slump for the second year.

There were no trends apparent for the Pupil Survey or My Class inventory, which were administered at the end of each year only.

First Year Correlations

These results are shown in Tables 10 through 13.

Intercorrelations of Fall Measures. A and L showed negative correlations with achievement which were small but consistent enough to suggest that they were real. There was also a suggestion that this relationship rose from the third grade to the higher grades, although it did not exceed the low thirties. The Dependence-Proneness scale appeared to be related in erratic fashion to achievement, with the correlations highest in the fifth grade, but reducing to essentially zero at the sixth grade. The creativity tests generally showed correlations which were positive but low with achievement, ranging generally from the teens to the low thirties. The correlations of the Non-Verbal tasks were near zero, while those for Unusual Uses were higher, presumably partly because of its verbal nature. It may also have been influenced by the fact that it was the last test in a series, so that those children who were inclined to "stick with it" despite fatigue and boredom earned higher scores, and perhaps also earned higher achievement scores on this basis. This was more likely to have been the case with lower grades than with the higher

Table 10

Correlations Between Product Measures for Third Grade Pupils for the First Project Year*

		Fall, 1962										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
Measure		Vocab. 1	Read. 2	Con. 3	Prod. 4	Tot. 5	A 6	L 7	D-P 8	Non-V 9	Prod. Imp. 10	Un. Uses 11
Fall, 1962												
Iowa Tests of Basic Skills												
Vocabulary	1	----	.763	.678	.543	.688	-.152	-.191	.149	.315	.337	.388
Reading	2		----	.736	.585	.743	-.163	-.164	.279	.312	.340	.374
Arith. Con.	3			----	.618	.923	-.114	-.220	.248	.222	.293	.345
Arith. Prob.	4				----	.871	-.150	-.119	.177	.207	.282	.356
Arith. Tot.	5					----	-.145	-.196	.242	.241	.320	.388
CMAS												
Anxiety	6						----	-.172	-.203	-.105	.005	-.022
L	7							----	.096	-.001	-.038	-.024
Dependence-Proneness	8								----	.128	.139	.157
Minn. Tests of Creativity												
Non-Verbal	9									----	.374	.282
Prod. Imp.	10										----	.544
Un. Uses	11											----

*N = 398

Table 10 (Continued)

Correlations Between Product Measures for Third Grade Pupils for the First Project Year*

		Spring, 1963										
		Iowa Tests of Basic Skills					CMAS			Minn. Tests of Creativity		
				Arithmetic								
Measure		Vocab. 12	Read. 13	Con. 14	Prob. 15	Tot. 16	A 17	L 18	D-P 19	Non-V 20	Prod. Imp. 21	Un. Uses 22
Fall, 1962												
Vocabulary	1	.690	.717	.574	.575	.615	-.167	-.188	.049	.143	.185	.272
Reading	2	.648	.722	.606	.617	.656	-.191	-.202	.147	.101	.199	.279
Arith. Con.	3	.580	.631	.645	.630	.683	-.139	-.244	.121	.069	.121	.230
Arith. Prob.	4	.442	.502	.443	.497	.501	-.162	-.192	.089	.088	.165	.277
Arith. Tot.	5	.578	.638	.619	.634	.670	-.166	-.245	.120	.086	.156	.277
CMAS: A	6	-.185	-.112	-.088	-.068	-.084	.605	-.067	-.148	-.099	-.052	.022
L	7	-.196	-.199	-.193	-.173	-.197	-.029	.424	.014	-.005	-.085	-.005
Dep.-Pron.	8	.218	.222	.215	.182	.215	-.103	-.032	.320	.040	.076	.140
Non-Verbal	9	.313	.342	.183	.208	.211	-.170	-.013	.057	.390	.176	.194
Prod. Imp.	10	.286	.316	.268	.296	.304	-.082	-.100	.077	.253	.376	.382
Un. Uses	11	.342	.399	.363	.346	.381	-.077	-.067	.005	.185	.297	.352
Spring, 1963												
Vocabulary	12	----	.728	.603	.605	.649	-.202	-.209	.115	.078	.174	.171
Reading	13		----	.686	.726	.757	-.190	-.257	.121	.098	.157	.225
Arith. Con.	14			----	.737	.936	-.100	-.269	.101	.056	.134	.213
Arith. Prob.	15				----	.926	-.150	-.251	.126	.010	.107	.234
Arith. Tot.	16					----	-.133	-.281	.123	.037	.131	.239
CMAS: A	17						----	-.044	-.194	-.159	-.062	.023
L	18							----	.136	-.002	-.123	-.005
Dep.-Pron.	19								----	.052	.083	.152
Non-Verbal	20									----	.307	.262
Prod. Imp.	21										----	.352
Un. Uses	22											----

*N = 398

Table 10 (Continued)

Correlations Between Product Measures for Third Grade Pupils for the First Project Year*

Measure		Spring, 1963			
			My Class		
		Pupil Survey 23	Halo 24	Disorder 25	Climate 26
Fall, 1962					
Vocabulary	1	.067	.084	.030	-.004
Reading	2	.039	.109	-.016	-.007
Arith. Con.	3	.109	.138	-.032	.008
Arith. Prob.	4	.059	.085	-.062	-.017
Arith. Tot.	5	.100	.127	-.051	.001
CMAS: A	6	-.171	-.115	.130	.032
L	7	.049	.079	-.178	.020
Dep.-Pron.	8	.019	.112	-.112	-.010
Non-Verbal	9	.156	-.069	.006	-.076
Prod. Imp.	10	.069	-.013	.068	.123
Un. Uses	11	.069	-.003	.095	.066
Spring, 1963					
Vocabulary	12	.076	.026	.017	-.059
Reading	13	.092	.074	.002	-.006
Arith. Con.	14	.018	.125	-.049	.022
Arith. Prob.	15	.049	.100	-.037	.009
Arith. Tot.	16	.034	.124	-.049	.016
CMAS: A	17	-.160	-.055	.183	.024
L	18	.159	.131	-.242	.012
Dep.-Pron.	19	.151	.209	-.257	-.023
Non-Verbal	20	.216	.006	.028	.021
Prod. Imp.	21	.163	-.010	-.019	.029
Un. Uses	22	.030	.038	-.110	.078
Pupil Survey	23	----	.119	-.054	.018
Halo	24		----	-.078	.106
Disorder	25			----	.052
Climate	26				----

*N = 398

Table 11

Correlations Between Product Measures for Fourth Grade Pupils for the First Project Year*

Measure		Fall, 1962										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
		Vocab. 1	Read. 2	Con. 3	Prob. 4	Tot. 5	A 6	L 7	D-P 8	Non-V 9	Prod. Imp. 10	Un. Uses 11
Fall, 1962												
Iowa Tests of Basic Skills												
Vocabulary	1	----	.747	.662	.608	.681	-.121	-.204	.166	.127	.225	.327
Reading	2		----	.704	.644	.723	-.188	-.164	.179	.230	.228	.331
Arith. Con.	3			----	.751	.941	-.237	-.123	.161	.133	.295	.344
Arith. Prob.	4				----	.928	-.193	-.142	.194	.182	.246	.260
Arith. Tot.	5					----	-.234	-.136	.187	.167	.293	.323
CMAS												
Anxiety	6						----	-.085	-.177	-.023	-.111	-.083
L	7							----	.066	-.047	-.045	-.060
Dependence-Proneness	8								----	.029	.152	.115
Minn. Tests of Creativity												
Non-Verbal	9									----	.332	.251
Prod. Imp.	10										----	.521
Un. Uses	11											----

*N = 358

Table 11 (Continued)

Correlations Between Product Measures for Fourth Grade Pupils for the First Project Year*

Measure		Spring, 1963										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
		Vocab. 12	Read. 13	Con. 14	Prob. 15	Tot. 16	A 17	L 18	D-P 19	Non-V 20	Prod. Imp. 21	Un. Uses 22
Fall, 1962												
Vocabulary	1	.717	.679	.552	.586	.616	-.192	-.253	.007	.107	.213	.341
Reading	2	.737	.728	.599	.625	.660	-.226	-.268	.021	.147	.260	.399
Arith. Con.	3	.680	.663	.712	.696	.757	-.231	-.207	-.003	.103	.213	.371
Arith. Prob.	4	.622	.625	.629	.651	.691	-.247	-.248	.034	.144	.217	.294
Arith. Tot.	5	.698	.689	.719	.721	.775	-.253	-.239	.013	.129	.230	.354
CMAS: A	6	-.221	-.175	-.223	-.205	-.229	.578	.082	-.157	-.006	-.179	-.063
L	7	-.163	-.185	-.165	-.189	-.188	.030	.402	.104	-.029	-.089	-.135
Dep.-Pron.	8	.202	.163	.139	.142	.156	-.171	.017	.410	.081	.159	.136
Non-Verbal	9	.167	.134	.112	.133	.134	-.099	-.085	.054	.523	.325	.229
Prod. Imp.	10	.292	.284	.296	.295	.317	-.117	-.100	.011	.265	.494	.324
Un. Uses	11	.347	.328	.294	.299	.320	-.134	-.176	.067	.261	.331	.407
Spring, 1963												
Vocabulary	12	----	.778	.668	.644	.705	-.317	-.292	.048	.107	.234	.344
Reading	13		----	.681	.673	.729	-.312	-.260	.065	.083	.206	.341
Arith. Con.	14			----	.718	.907	-.270	-.252	-.011	.107	.219	.312
Arith. Prob.	15				----	.943	-.271	-.213	.026	.128	.275	.354
Arith. Tot.	16					----	-.293	-.248	.012	.131	.271	.365
CMAS: A	17						----	.154	-.203	.040	-.142	-.158
L	18							----	.093	-.028	-.134	-.169
Dep.-Pron.	19								----	.020	.054	.018
Non-Verbal	20									----	.358	.313
Prod. Imp.	21										----	.465
Un. Uses	22											----

*N = 358

Table 11 (Continued)

Correlations Between Product Measures for Fourth Grade Pupils for the First Project Year*

Measure		Spring, 1963			
			My Class		
		Pupil Survey 23	Halo 24	Disorder 25	Climate 26
Fall, 1962					
Vocabulary	1	.022	-.080	.025	.071
Reading	2	.104	-.043	.015	.037
Arith. Con.	3	.061	-.050	-.006	.049
Arith. Prob.	4	.059	-.010	-.034	.108
Arith. Tot.	5	.069	-.034	-.022	.081
CMAS: A	6	-.093	-.063	.163	.001
L	7	.076	.093	-.091	-.036
Dep.-Pron.	8	.135	.053	-.209	.043
Non-Verbal	9	.171	-.035	.012	.022
Prod. Imp.	10	.131	.065	-.007	-.014
Un. Uses	11	.105	.069	-.019	.033
Spring, 1963					
Vocabulary	12	.071	.010	-.027	.064
Reading	13	.066	.075	-.046	.102
Arith. Con.	14	.078	.024	-.041	.039
Arith. Prob.	15	.096	.056	-.138	.077
Arith. Tot.	16	.096	.046	-.105	.069
CMAS: A	17	-.077	-.069	.275	-.089
L	18	.137	.049	-.169	.007
Dep.-Pron.	19	.188	.295	-.248	.144
Non-Verbal	20	.131	-.033	.003	.019
Prod. Imp.	21	.236	.047	-.020	.046
Un. Uses	22	.053	-.034	-.034	.053
Pupil Survey	23	----	.206	-.055	.072
Halo	24		----	-.175	.020
Disorder	25			----	-.015
Climate	26				----

*N = 358

Table 12

Correlations Between Product Measures for Fifth Grade Pupils for the First Project Year*

		Fall, 1962										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
Measure		Vocab. 1	Read. 2	Con. 3	Prob. 4	Tot. 5	A 6	L 7	D-P 8	Non-V 9	Prod. Imp. 10	Un. Uses 11
Fall, 1962												
Iowa Tests of Basic Skills												
Vocabulary	1	----	.793	.589	.612	.661	-.214	-.297	.273	.177	.168	.261
Reading	2		----	.665	.667	.731	-.225	-.319	.293	.154	.113	.194
Arith. Con.	3			----	.655	.892	-.166	-.251	.286	.141	.133	.145
Arith. Prob.	4				----	.924	-.170	-.179	.267	.137	.113	.151
Arith. Tot.	5					----	-.184	-.231	.301	.152	.130	.161
CMAS												
Anxiety	6						----	-.065	-.211	-.066	-.030	-.047
L	7							----	.021	.062	.018	-.010
Dependence-Proneness	8								----	.080	.052	.046
Minn. Tests of Creativity												
Non-Verbal	9									----	.369	.293
Prod. Imp.	10										----	.487
Un. Uses	11											----

*N = 353

Table 12 (Continued)

Correlations Between Product Measures for Fifth Grade Pupils for the First Project Year*

		Spring, 1963										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
Measure		Vocab. 12	Read. 13	Con. 14	Prob. 15	Tot. 16	A 17	L 18	D-P 19	Non-V 20	Prod. Imp. 21	Un. Uses 22
Fall, 1962												
Vocabulary	1	.833	.783	.587	.571	.622	-.277	-.268	.214	.193	.197	.315
Reading	2	.804	.822	.654	.628	.686	-.290	-.290	.263	.192	.201	.312
Arith. Con.	3	.616	.644	.712	.632	.716	-.218	-.275	.241	.136	.121	.239
Arith. Prob.	4	.611	.646	.595	.669	.682	-.221	-.212	.277	.120	.153	.320
Arith. Tot.	5	.673	.708	.710	.712	.763	-.240	-.264	.285	.141	.154	.308
CMAS: A	6	-.201	-.149	-.190	-.153	-.181	.622	-.062	-.118	-.011	-.020	-.057
L	7	-.331	-.347	-.243	-.213	-.246	.040	.528	.096	-.033	-.023	-.038
Dep.-Pron.	8	.332	.312	.298	.245	.289	-.158	-.022	.450	.091	.145	.203
Non-Verbal	9	.176	.183	.188	.168	.184	-.070	-.008	.117	.396	.258	.186
Prod. Imp.	10	.178	.179	.232	.189	.221	-.020	-.024	.063	.401	.521	.306
Un. Uses	11	.251	.269	.150	.141	.155	-.059	-.031	.078	.335	.385	.402
Spring, 1963												
Vocabulary	12	----	.846	.675	.621	.695	-.261	-.313	.237	.187	.244	.349
Reading	13		----	.708	.677	.743	-.264	-.311	.264	.135	.260	.332
Arith. Con.	14			----	.727	.907	-.256	-.300	.214	.115	.265	.296
Arith. Prob.	15				----	.948	-.246	-.202	.245	.125	.237	.257
Arith. Tot.	16					----	-.269	-.262	.249	.130	.264	.292
CMAS: A	17						----	-.023	-.200	-.015	-.018	-.066
L	18							----	.069	.019	-.041	-.055
Dep.-Pron.	19								----	.091	.145	.208
Non-Verbal	20									----	.470	.340
Prod. Imp.	21										----	.497
Un. Uses	22											----

*N = 353

Table 12 (Continued)

Correlations Between Product Measures for Fifth Grade Pupils for the First Project Year*

Measure		Spring, 1963			
			My Class		
		Pupil Survey 23	Halo 24	Disorder 25	Climate 26
Fall, 1962					
Vocabulary	1	.180	.101	-.109	-.026
Reading	2	.175	.097	-.119	-.024
Arith. Con.	3	.165	.118	-.194	.025
Arith. Prob.	4	.206	.172	-.214	-.072
Arith. Tot.	5	.206	.157	-.222	-.032
CMAS: A	6	.007	-.077	.157	.023
L	7	.017	.095	-.076	.090
Dep.-Pron.	8	.180	.192	-.153	-.010
Non-Verbal	9	.259	.162	-.118	-.150
Prod. Imp.	10	.282	.073	-.071	-.011
Un. Uses	11	.227	.026	.044	-.021
Spring, 1963					
Vocabulary	12	.191	.063	-.125	-.060
Reading	13	.179	.071	-.143	-.036
Arith. Con.	14	.185	.079	-.166	.014
Arith. Prob.	15	.199	.116	-.220	-.003
Arith. Tot.	16	.205	.109	-.211	.005
CMAS: A	17	-.092	-.167	.366	.056
L	18	.064	.080	-.135	.121
Dep.-Pron.	19	.265	.334	-.322	.015
Non-Verbal	20	.254	.010	-.022	.011
Prod. Imp.	21	.354	.045	.031	.063
Un. Uses	22	.234	.097	-.061	.051
Pupil Survey	23	----	.204	-.073	.084
Halo	24		----	-.277	-.015
Disorder	25			----	.042
Climate	26				----

*N = 353

Table 13

Correlations Between Product Measures for Sixth Grade Pupils for the First Project Year*

Measure		Fall, 1962										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
		Vocab. 1	Read. 2	Con. 3	Prob. 4	Tot. 5	A 6	L 7	D-P 8	Non-V 9	Prod. Imp. 10	Un. Uses 11
Fall, 1962												
Iowa Tests of Basic Skills												
Vocabulary	1	----	.831	.565	.498	.574	-.260	-.282	.119	.049	.175	.174
Reading	2		----	.663	.618	.692	-.266	-.286	.142	.108	.187	.247
Arith. Con.	3			----	.688	.909	-.242	-.246	.083	.089	.077	.133
Arith. Prob.	4				----	.927	-.237	-.216	.094	.064	.125	.156
Arith. Tot.	5					----	-.259	-.250	.098	.081	.109	.156
CMAS												
Anxiety	6						----	-.074	-.233	-.090	-.034	-.076
L	7							----	.136	-.009	-.047	-.132
Dependence-Proneness	8								----	.019	.038	.076
Minn. Tests of Creativity												
Non-Verbal	9									----	.282	.252
Prod. Imp.	10										----	.487
Un. Uses	11											----

*N = 380

Table 13 (Continued)

Correlations Between Product Measures for Sixth Grade Pupils for the First Project Year*

		Spring, 1963										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
Measure		Vocab. 12	Read. 13	Con. 14	Prob. 15	Tot. 16	A 17	L 18	D-P 19	Non-V 20	Prod. Imp. 21	Un. Uses 22
Fall, 1962												
Vocabulary	1	.855	.783	.621	.542	.619	-.264	-.288	.069	.076	.080	.155
Reading	2	.809	.840	.680	.631	.700	-.268	-.273	.096	.122	.150	.215
Arith. Con.	3	.574	.634	.778	.653	.760	-.209	-.260	.099	.085	.086	.206
Arith. Prob.	4	.525	.576	.678	.727	.754	-.208	-.229	.086	.131	.169	.238
Arith. Tot.	5	.595	.653	.788	.753	.823	-.225	-.266	.099	.117	.137	.242
CMAS: A	6	-.254	-.261	-.309	-.210	-.274	.662	.044	-.214	-.039	-.039	-.131
L	7	-.269	-.303	-.248	-.191	-.230	.004	.388	.092	-.007	-.009	-.147
Dep.-Pron.	8	.161	.200	.120	.127	.131	-.147	.055	.400	.051	-.001	.170
Non-Verbal	9	.068	.106	.073	.107	.095	-.060	.029	.022	.538	.233	.228
Prod. Imp.	10	.207	.185	.183	.135	.165	-.158	-.054	.085	.315	.530	.248
Un. Uses	11	.204	.210	.161	.160	.174	-.121	-.079	.066	.257	.386	.326
Spring, 1963												
Vocabulary	12	----	.812	.668	.572	.658	-.251	-.291	.102	.047	.078	.172
Reading	13		----	.716	.670	.739	-.264	-.303	.119	.080	.081	.176
Arith. Con.	14			----	.742	.915	-.277	-.295	.102	.106	.127	.277
Arith. Prob.	15				----	.947	-.162	-.254	.122	.150	.113	.198
Arith. Tot.	16					----	-.234	-.290	.119	.137	.125	.244
CMAS: A	17						----	-.067	-.334	.018	.006	-.085
L	18							----	.186	-.035	-.004	-.120
Dep.-Pron.	19								----	.023	.065	.027
Non-Verbal	20									----	.408	.312
Prod. Imp.	21										----	.361
Un. Uses	22											----

*N = 380

Table 13 (Continued)

Correlations Between Product Measures for Sixth Grade Pupils for the First Project Year*

Measure		Spring, 1963			
			My Class		
		Pupil Survey 23	Halo 24	Disorder 25	Climate 26
Fall, 1962					
Vocabulary	1	.001	.049	-.068	-.040
Reading	2	.037	.118	-.094	-.030
Arith. Con.	3	-.015	.101	-.148	.016
Arith. Prob.	4	.000	.134	-.144	.016
Arith. Tot.	5	-.008	.128	-.157	.015
CMAS: A	6	-.046	-.203	.232	-.093
L	7	.168	.117	-.027	.053
Dep.-Pron.	8	.157	.238	-.196	.035
Non-Verbal	9	.145	.128	.003	-.041
Prod. Imp.	10	.203	.123	-.096	-.033
Un. Uses	11	.179	.120	.017	.020
Spring, 1963					
Vocabulary	12	.039	.048	-.071	-.003
Reading	13	-.040	.096	-.082	.002
Arith. Con.	14	-.012	.104	-.142	.039
Arith. Prob.	15	.012	.132	-.076	.042
Arith. Tot.	16	-.001	.128	-.110	.049
CMAS: A	17	-.153	-.289	.393	-.055
L	18	.182	.069	-.119	.073
Dep.-Pron.	19	.243	.330	-.422	-.028
Non-Verbal	20	.151	.097	.044	-.035
Prod. Imp.	21	.220	.079	-.035	.067
Un. Uses	22	.172	.030	-.156	.056
Pupil Survey	23	----	.289	-.095	.101
Halo	24		----	-.300	.175
Disorder	25			----	.068
Climate	26				----

*N = 380

grades, since the work of writing presumably became less laborious at the upper grades.

There also appeared to be a trend in the data for the correlations of creativity with achievement to be highest in the third grade (generally in the thirties), but for the relationships to decline with higher grade levels. Contrary to expectation, A and L did not correlate with the creativity measures.

The creativity measures generally intercorrelated from the twenties to the fifties.

Intercorrelations Fall to Spring. The only correlations from fall to spring that seemed to be of particular interest were the intercorrelations of the creativity measures with themselves. These ranged from the thirties to the fifties.

Intercorrelations of Spring Measures. In the spring, the A and L scores correlated in similar fashion with achievement as in the previous fall. The correlations of the creativity measures with achievement measures in the spring seemed to be essentially similar to those in the fall, except for the third grade for which they appeared to be lower.

The correlations of Dependence-Proneness with achievement remained similar, for the fifth grade, but for the other grades largely vanished.

The four measures of attitude did not generally correlate with achievement in the spring. However, Disorder showed increasing correlation with Anxiety starting in the teens for the third grade and rising to the upper thirties for the fifth and sixth grades. It showed the same increasing correlation, although negative, with Dependence-Proneness, ranging from the mid twenties to the low forties at the sixth grade. Similarly, the correlation of Halo with Dependence-Proneness rose to the low thirties. Apparently, with increasing grade level, anxious pupils saw more disorder in the classroom, but dependent pupils saw less and liked the teacher more. Pupil Survey showed occasional small correlations with creativity, especially at the fifth grade.

Second Year Correlations

The results for the second year are shown in Tables 14 through 17.

Intercorrelations of Spring Measures. The correlations of A and L with achievement were similar to those for the previous fall and spring. Dependence-Proneness generally showed correlations in the twenties with achievement, except for the fourth grade, where they were essentially zero. Again, the correlations of the creativity measures with achievement measures were essentially similar to those for the two previous testings.

As in the previous spring, the attitude measures did not generally correlate with achievement. However, the negative correlation of Disorder with Anxiety appeared to be somewhat higher, ranging from the thirties to the fifties. The same negative correlations between Disorder and Dependence-Proneness were found. These relations of Disorder with Anxiety and Dependence-Proneness support the interpretation that with increasing grade level, anxious pupils saw more disorder in the classroom, while dependent pupils saw less.

Summary of Product Measures

The subjects were an above average group who showed no evidence of summer slump. The correlations of A and L with achievement were low negative; of creativity with achievement, low positive. Anxious pupils saw

Table 14

Correlations Between Product Measures for Third Grade Pupils for the Second Project Year*

		Fall, 1963										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
Measure		Vocab. 1	Read. 2	Con. 3	Prob. 4	Tot. 5	A 6	L 7	D-P 8	Non-V 9	Prod. Imp. 10	Un. Uses 11
Fall, 1963												
Iowa Tests of Basic Skills												
Vocabulary	1	----	.731	.611	.589	.661	-.136	-.102	.261	.107	.385	.265
Reading	2		----	.625	.729	.740	-.090	-.111	.284	.090	.383	.276
Arith. Con.	3			----	.625	.921	-.166	-.112	.226	.114	.324	.247
Arith. Prob.	4				----	.878	-.051	-.041	.235	.113	.339	.152
Arith. Tot.	5					----	-.124	-.089	.253	.126	.363	.225
CMAS												
Anxiety	6						----	-.095	-.281	-.036	-.097	-.015
L	7							----	.140	-.047	.004	-.007
Dependence-Proneness	8								----	.088	.193	.090
Minn. Tests of Creativity												
Non-Verbal	9									----	.418	.177
Prod. Imp.	10										----	.356
Un. Uses	11											----

*N = 327

Table 14 (Continued)

Correlations Between Product Measures for Third Grade Pupils for the Second Project Year*

Measure		Spring, 1964										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
		Vocab. 12	Read. 13	Con. 14	Prob. 15	Tot. 16	A 17	L 18	D-P 19	Non-V 20	Prod. Imp. 21	Un. Uses 22
Fall, 1963												
Vocabulary	1	.689	.662	.581	.576	.618	-.208	-.094	.250	.199	.301	.253
Reading	2	.706	.704	.561	.572	.603	-.230	-.106	.214	.253	.297	.273
Arith. Con.	3	.627	.602	.624	.602	.651	-.235	-.109	.218	.151	.252	.274
Arith. Prob.	4	.575	.539	.494	.538	.548	-.160	-.049	.196	.273	.280	.240
Arith. Tot.	5	.662	.631	.622	.633	.667	-.224	-.091	.228	.226	.282	.281
CMAS: A	6	-.210	-.176	-.080	-.061	-.074	.568	-.116	-.269	-.134	-.031	-.104
L	7	-.127	-.098	-.090	-.065	-.080	-.094	.461	.181	.013	.013	.037
Dep.-Pron.	8	.290	.307	.191	.263	.241	-.351	.127	.407	.140	.124	.137
Non-Verbal	9	.137	.132	.138	.114	.138	-.046	-.093	.071	.449	.346	.210
Prod. Imp.	10	.349	.331	.320	.318	.342	-.176	-.076	.120	.372	.446	.274
Un. Uses	11	.260	.294	.274	.309	.314	-.077	.006	.153	.224	.345	.351
Spring, 1964												
Vocabulary	12	----	.793	.707	.693	.749	-.297	-.110	.326	.239	.338	.385
Reading	13		----	.661	.671	.713	-.241	-.112	.292	.263	.308	.290
Arith. Con.	14			----	.752	.940	-.225	-.123	.246	.164	.299	.281
Arith. Prob.	15				----	.231	-.254	-.098	.307	.158	.229	.310
Arith. Tot.	16					----	-.252	-.116	.294	.173	.285	.316
CMAS: A	17						----	-.062	-.377	-.134	-.079	-.157
L	18							----	.186	.084	-.005	.033
Dep.-Pron.	19								----	.170	.145	.213
Non-Verbal	20									----	.445	.242
Prod. Imp.	21										----	.386
Un. Uses	22											----

*N = 327

Table 14 (Continued)

Correlations Between Product Measures for Third Grade Pupils for the Second Project Year*

Measure		Spring, 1964		
			My Class	
		Pupil Survey 23	Disorder 24	Climate 25
Spring, 1963				
Vocabulary	1	.137	-.079	.111
Reading	2	.172	-.105	.104
Arith. Con.	3	.169	-.155	-.009
Arith. Prob.	4	.159	-.127	.159
Arith. Tot.	5	.181	-.157	.067
CMAS: A	6	-.115	.165	-.096
L	7	.144	-.265	.059
Dep.-Pron.	8	.148	-.227	-.005
Non-Verbal	9	.117	.019	.041
Prod. Imp.	10	.241	-.097	.040
Un. Uses	11	.182	-.027	.108
Spring, 1964				
Vocabulary	12	.097	-.117	.084
Reading	13	.110	-.103	.061
Arith. Con.	14	.039	-.171	.025
Arith. Prob.	15	.104	-.145	.025
Arith. Tot.	16	.076	-.169	.030
CMAS: A	17	-.242	.445	.079
L	18	.189	-.235	.171
Dep.-Pron.	19	.224	-.339	.066
Non-Verbal	20	.271	-.106	.135
Prod. Imp.	21	.168	-.086	.076
Un. Uses	22	.054	-.076	.071
Pupil Survey	23	----	-.175	.054
Disorder	24		----	.211
Climate	25			----

*N = 327

Table 15

Correlations Between Product Measures for Fourth Grade Pupils for the Second Project Year*

Measure		Spring, 1963										
		Iowa Tests of Basic Skills					CMAS			Minn. Tests of Creativity		
				Arithmetic								
		Vocab. 1	Read. 2	Con. 3	Prob. 4	Tot. 5	A 6	L 7	D-P 8	Non-V 9	Prod. Imp. 10	Un. Uses 11
Spring, 1963												
Iowa Tests of Basic Skills												
Vocabulary	1	----	.734	.597	.605	.647	-.148	-.246	.112	.043	.164	.193
Reading	2		----	.701	.749	.779	-.159	-.299	.102	.057	.134	.201
Arith. Con.	3			----	.727	.932	-.047	-.311	.074	.069	.112	.217
Arith. Prob.	4				----	.925	-.136	-.299	.167	.018	.094	.234
Arith. Tot.	5					----	-.094	-.331	.129	.049	.113	.241
CMAS												
Anxiety	6						----	-.020	-.212	-.123	-.058	.068
L	7							----	.165	.000	-.112	-.007
Dependence-Proneness	8								----	.023	.103	.195
Minn. Tests of Creativity												
Non-Verbal	9									----	.277	.263
Prod. Imp.	10										----	.344
Un. Uses	11											----

*N = 302

Table 15 (Continued)

Correlations Between Product Measures for Fourth Grade Pupils for the Second Project Year*

Measure		Spring, 1964										
		Iowa Tests of Basic Skills					CMAS			Minn. Tests of Creativity		
				Arithmetic								
		Vocab. 12	Read. 13	Con. 14	Prob. 15	Tot. 16	A 17	L 18	D-P 19	Non-V 20	Prod. Imp. 21	Un. Uses 22
Spring, 1963												
Vocabulary	1	.715	.683	.573	.512	.581	-.249	-.132	.045	.098	.124	.240
Reading	2	.771	.800	.622	.630	.676	-.249	-.170	.098	.129	.149	.243
Arith. Con.	3	.634	.670	.696	.624	.708	-.182	-.168	.054	.096	.060	.123
Arith. Prob.	4	.626	.669	.615	.638	.677	-.264	-.141	.135	.077	.046	.239
Arith. Tot.	5	.681	.720	.705	.679	.745	-.234	-.170	.095	.097	.056	.196
CMAS: A	6	-.190	-.150	-.086	-.082	-.092	.512	-.066	-.230	-.101	-.103	-.040
L	7	-.263	-.288	-.275	-.178	-.244	.024	.356	.061	-.034	-.058	-.038
Dep.-Pron.	8	.119	.083	.160	.117	.146	-.143	.187	.328	.005	.157	.130
Non-Verbal	9	.023	.005	-.013	-.046	-.032	-.157	-.029	.008	.448	.234	.183
Prod. Imp.	10	.124	.076	.123	.105	.122	-.062	-.105	.044	.317	.429	.199
Un. Uses	11	.222	.167	.195	.224	.232	-.082	.044	.165	.268	.198	.233
Spring, 1964												
Vocabulary	12	----	.788	.640	.623	.679	-.275	-.155	.113	.109	.132	.261
Reading	13		----	.638	.637	.687	-.207	-.193	.050	.051	.061	.198
Arith. Con.	14			----	.708	.910	-.240	-.152	.088	.073	.124	.260
Arith. Prob.	15				----	.935	-.192	-.093	.090	.002	.157	.229
Arith. Tot.	16					----	-.235	-.134	.100	.037	.154	.263
CMAS: A	17						----	-.136	-.373	-.115	-.075	-.105
L	18							----	.228	-.028	-.022	-.031
Dep.-Pron.	19								----	.093	.097	.141
Non-Verbal	20									----	.330	.352
Prod. Imp.	21										----	.434
Un. Uses	22											----

*N = 302

Table 15 (Continued)

Correlations Between Product Measures for Fourth Grade Pupils for the Second Project Year*

Measures		Spring, 1964		
			My Class	
		Pupil Survey 23	Disorder 24	Climate 25
Spring, 1963				
Vocabulary	1	.074	-.178	.096
Reading	2	.047	-.245	.138
Arith. Con.	3	.009	-.189	.014
Arith. Prob.	4	.052	-.203	.047
Arith. Tot.	5	.031	-.208	.030
CMAS: A	6	-.133	.247	-.024
L	7	.109	.046	-.089
Dep.-Pron.	8	.240	-.137	.101
Non-Verbal	9	.111	-.006	.004
Prod. Imp.	10	.083	-.054	.018
Un. Uses	11	.034	-.092	.095
Spring, 1964				
Vocabulary	12	.000	-.235	.129
Reading	13	-.028	-.192	.083
Arith. Con.	14	.027	-.202	.113
Arith. Prob.	15	.041	-.187	.027
Arith. Tot.	16	.035	-.214	.077
CMAS: A	17	-.194	.486	-.099
L	18	.321	-.278	-.006
Dep.-Pron.	19	.223	-.291	.112
Non-Verbal	20	.090	-.043	.019
Prod. Imp.	21	.187	-.087	.055
Un. Uses	22	.250	-.094	.059
Pupil Survey	23	----	-.132	.021
Disorder	24		----	-.027
Climate	25			----

*N = 302

Table 16

Correlations Between Product Measures for Fifth Grade Pupils for the Second Project Year*

		Spring, 1963										
		Iowa Tests of Basic Skills					CMAS			Minn. Tests of Creativity		
				Arithmetic								
Measure		Vocab. 1	Read. 2	Con. 3	Prob. 4	Tot. 5	A 6	L 7	D-P 8	Non-V 9	Prod. Imp. 10	Un. Uses 11
Spring, 1963												
Iowa Tests of Basic Skills												
Vocabulary	1	----	.783	.666	.660	.718	-.314	-.320	.056	.092	.237	.346
Reading	2		----	.666	.692	.737	-.292	-.308	.081	.035	.159	.303
Arith. Con.	3			----	.702	.902	-.262	-.309	-.005	.081	.145	.274
Arith. Prod.	4				----	.939	-.263	-.244	.041	.099	.258	.323
Arith. Tot.	5					----	-.285	-.295	.002	.101	.229	.329
CMAS												
Anxiety	6						----	.161	-.170	.102	-.121	-.146
L	7							----	.092	-.046	-.120	-.194
Dependence-Proneness	8								----	.043	-.000	.018
Minn. Tests of Creativity												
Non-Verbal	9									----	.382	.316
Prod. Imp.	10										----	.489
Un. Uses	11											----

*N = 263

Table 16 (Continued)

Correlations Between Product Measures for Fifth Grade Pupils for the Second Project Year*

		Spring, 1964										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
Measure		Vocab. 12	Read. 13	Con. 14	Prob. 15	Tot. 16	A 17	L 18	D-P 19	Non-V 20	Prod. Imp. 21	Un. Uses 22
Spring, 1963												
Vocabulary	1	.830	.763	.613	.589	.642	-.332	-.249	.183	.080	.183	.325
Reading	2	.783	.756	.650	.623	.680	-.341	-.284	.214	.085	.173	.317
Arith. Con:	3	.659	.655	.707	.576	.680	-.327	-.256	.155	.084	.244	.240
Arith. Prob.	4	.644	.647	.653	.651	.696	-.324	-.242	.173	.151	.253	.336
Arith. Tot.	5	.703	.704	.733	.668	.746	-.356	-.269	.179	.132	.269	.321
CMAS: A	6	-.308	-.320	-.314	-.259	-.307	.635	.027	-.180	.007	-.094	-.296
L	7	-.338	-.313	-.283	-.192	-.246	.139	.423	-.041	.018	-.118	-.172
Dep.-Pron.	8	.067	.115	.114	.066	.095	-.116	.102	.401	.031	.102	.065
Non-Verbal	9	.082	.114	.032	.099	.072	.030	-.070	.047	.486	.304	.230
Prod. Imp.	10	.277	.265	.177	.190	.197	-.182	-.115	.126	.225	.420	.311
Un. Uses	11	.356	.378	.259	.261	.275	-.245	-.169	.141	.091	.272	.351
Spring, 1964												
Vocabulary	12	----	.845	.702	.668	.729	-.340	-.321	.177	.036	.224	.337
Reading	13		----	.719	.717	.766	-.361	-.274	.265	.124	.185	.337
Arith. Con.	14			----	.739	.917	-.357	-.240	.219	.029	.217	.289
Arith. Prob.	15				----	.945	-.301	-.217	.236	.110	.166	.237
Arith. Tot.	16					----	-.349	-.243	.247	.080	.206	.282
CMAS: A	17						----	-.040	-.350	-.037	-.133	-.233
L	18							----	.054	-.004	-.155	.122
Dep.-Pron.	19								----	.082	.126	.191
Non-Verbal	20									----	.322	.310
Prod. Imp.	21										----	.379
Un. Uses	22											----

*N = 263

Table 16 (Continued)

Correlations Between Product Measures for Fifth Grade Pupils for the Second Project Year*

Measure		Spring, 1964		
			My Class	
		Pupil Survey 23	Disorder 24	Climate 25
Spring, 1963				
Vocabulary	1	.147	-.226	.102
Reading	2	.068	-.242	.053
Arith. Con.	3	.139	-.246	.043
Arith. Prob.	4	.143	-.226	.041
Arith. Tot.	5	.152	-.257	.043
CMAS: A	6	-.071	.313	-.064
L	7	.003	.004	-.061
Dep.-Pron.	8	.097	-.164	.060
Non-Verbal	9	.188	.062	-.065
Prod. Imp.	10	.180	-.047	.099
Un. Uses	11	.143	-.159	-.012
Spring, 1964				
Vocabulary	12	.076	-.206	.002
Reading	13	.103	-.269	.050
Arith. Con.	14	.056	-.322	.009
Arith. Prob.	15	.069	.305	.008
Arith. Tot.	16	.068	-.335	.012
CMAS: A	17	-.092	.533	-.104
L	18	.052	-.236	.037
Dep.-Pron.	19	.162	-.324	.113
Non-Verbal	20	.133	-.058	-.006
Prod. Imp.	21	.108	-.009	.105
Un. Uses	22	.187	-.084	.055
Pupil Survey	23	----	.034	.120
Disorder	24		----	-.062
Climate	25			----

*N = 263

Table 17

Correlations Between Product Measures for Sixth Grade Pupils for the Second Project Year*

		Spring, 1963										
		Iowa Tests of Basic Skills								Minn. Tests of Creativity		
				Arithmetic			CMAS					
Measure		Vocab. 1	Read. 2	Con. 3	Prob. 4	Tot. 5	A 6	L 7	D-P 8	Non-V 9	Prod. Imp. 10	Un. Uses 11
Spring, 1963												
Iowa Tests of Basic Skills												
Vocabulary	1	----	.847	.653	.598	.670	-.258	-.322	.239	.197	.214	.362
Reading	2		----	.708	.665	.736	-.263	-.305	.269	.141	.243	.326
Arith. Con.	3			----	.726	.906	-.246	-.295	.213	.077	.229	.289
Arith. Prob.	4				----	.947	-.257	-.178	.248	.121	.192	.267
Arith. Tot.	5					----	-.273	-.246	.254	.110	.220	.293
CMAS												
Anxiety	6						----	.005	-.172	-.042	-.060	-.083
L	7							----	.063	.045	-.021	-.086
Dependence-Proneness	8								----	.084	.134	.219
Minn. Tests of Creativity												
Non-Verbal	9									----	.433	.338
Prod. Imp.	10										----	.478
Un. Uses	11											----

*N = 264

Table 17 (Continued)

Correlations Between Product Measures for Sixth Grade Pupils for the Second Project Year*

Measure		Spring, 1964										
		Iowa Tests of Basic Skills					CMAS			Minn. Tests of Creativity		
				Arithmetic								
		Vocab. 12	Read. 13	Con. 14	Prob. 15	Tot. 16	A 17	L 18	D-P 19	Non-V 20	Prod. Imp. 21	Un. Uses 22
Spring, 1963												
Vocabulary	1	.881	.849	.633	.602	.657	-.145	-.330	.215	.099	.208	.301
Reading	2	.818	.846	.645	.638	.685	-.130	-.308	.211	.093	.198	.265
Arith. Con.	3	.629	.658	.725	.647	.727	-.161	-.264	.184	.070	.237	.266
Arith. Prob.	4	.558	.587	.599	.655	.675	-.116	-.196	.204	.075	.175	.196
Arith. Tot.	5	.634	.666	.703	.702	.751	-.150	-.242	.214	.076	.215	.245
CMAS: A	6	-.283	-.262	-.129	-.229	-.203	.566	.123	-.116	.171	.045	-.065
L	7	-.273	-.256	-.230	-.151	-.199	.069	.384	-.038	-.066	.001	-.140
Dep.-Pron.	8	.270	.236	.237	.261	.266	-.201	-.008	.579	.037	.063	.162
Non-Verbal	9	.171	.160	.073	.130	.111	-.019	.024	.107	.454	.205	.233
Prod. Imp.	10	.224	.217	.192	.238	.233	-.052	-.077	.170	.354	.432	.313
Un. Uses	11	.328	.363	.307	.296	.324	-.038	-.104	.218	.285	.305	.445
Spring, 1964												
Vocabulary	12	----	.858	.646	.644	.688	-.142	-.296	.201	.053	.163	.277
Reading	13		----	.725	.697	.758	-.107	-.355	.189	.105	.171	.304
Arith. Con.	14			----	.748	.913	-.081	-.220	.285	.043	.216	.276
Arith. Prob.	15				----	.953	-.162	-.115	.297	.008	.172	.259
Arith. Tot.	16					----	-.139	-.170	.313	.021	.202	.281
CMAS: A	17						----	-.086	-.258	.138	.011	-.025
L	18							----	.046	-.031	.069	-.094
Dep.-Pron.	19								----	.063	.178	.255
Non-Verbal	20									----	.288	.346
Prod. Imp.	21										----	.402
Un. Uses	22											----

*N = 264

Table 17 (Continued)

Correlations Between Product Measures for Sixth Grade Pupils for the Second Project Year*

Measure		Spring, 1964		
			My Class	
		Pupil Survey 23	Disorder 24	Climate 25
Spring, 1963				
Vocabulary	1	.044	-.108	.164
Reading	2	.042	-.143	.147
Arith. Con.	3	-.026	-.210	.096
Arith. Prob.	4	-.137	-.163	.095
Arith. Tot.	5	-.098	-.197	.100
CMAS: A	6	.052	.237	-.091
L	7	-.038	-.071	-.009
Dep.-Pron.	8	.093	-.373	.032
Non-Verbal	9	.182	-.031	.092
Prod. Imp.	10	.320	-.144	.027
Un. Uses	11	.130	-.175	.028
Spring, 1964				
Vocabulary	12	.051	-.116	.167
Reading	13	.008	-.096	.117
Arith. Con.	14	-.008	-.167	.023
Arith. Prob.	15	.013	-.139	.055
Arith. Tot.	16	.004	-.166	.043
CMAS: A	17	-.062	.328	-.010
L	18	.118	-.142	.028
Dep.-Pron.	19	.244	-.406	-.027
Non-Verbal	20	.183	.016	.016
Prod. Imp.	21	.162	-.072	.025
Un. Uses	22	.188	-.091	-.039
Pupil Survey	23	----	-.203	.053
Disorder	24		----	-.094
Climate	25			----

*N = 264

more disorder in the classroom, dependent pupils less, and both relationships increased with grade level.

Reduction of Product Measures

The data reported so far have been measures of pupil status at three points in time. The scores that were obtained at these points were next reduced to residual true gain scores for the two intervening periods of time, each of the project years. The effect of this reduction process was to eliminate the effects of regression due to unreliability and to eliminate the relation of change to initial standing, so as to produce scores which would reflect the influence of the classroom more clearly.

Process Measures

The preceeding section has outlined the reduction of the product measures to measures of pupil growth for each of two years, so that these would be ready for analysis in relation to measures of classroom behavior. In this section, the reduction of the measures of classroom process to a form in which they could be factor analyzed and reduced to more basic dimensions will be discussed. Since the measures from the Flanders' Interaction Analysis were immediately amenable to this statistical treatment, they will not be discussed here. But since the other observation schedule, the South Carolina Observation Record (SCOR), was assembled from a number of sources, the initial reduction of the measures was carried out before being entered into the first factor analysis.

Reduction of South Carolina Observation Record Measures. As indicated in the procedure section, all of the items derived from SCOR were initially treated by a Hoyt analysis of variance reliability in which observers and occasions were pooled in the error term. The same process was carried out for the second year data and the intercorrelations between items for the two years were computed.

In general, items were eliminated which did not have a reliability of at least .20 the first year, but one item, Pupil Non-Verbal Affection, was carried forward because of its relatively high reliability the second year. These data for the items which were carried forward to the factor analysis are shown in Table 18. These results are as perplexing, perhaps, as they are clarifying. There are occasional items which are both reliable for the two years and consistent from one year to the other. Measure 6, the Pupil Interest Attention Rating, is one of the better examples of items of this sort, although in general the measures of affect show at least modest levels of reliability and of stability across the two years. Similarly, the measure of Free Movement is quite reliable and quite stable. On the other hand, there are items which show at least modest reliability the first year, but which show little reliability the second year and essentially zero correlation from one year to the next. Groupings of Pupils in general fall under this category. Then there are items such as Measure 1, Cleans, Decorates Board, which were relatively reliable both years but unrelated from one year to the next.

Although numbers of items in this listing did not appear to hold much promise as measures of stable characteristics of classroom process, they were carried forward so that a relatively complete set of measures (from those collected in this project) would be screened on the basis of their fitting together into more basic sets of dimensions, rather than on the characteristics of individual items in themselves. The assumption was

Table 18

Reliabilities and Intercorrelations Over Two Years for Items from the South Carolina Observation Record

	Item	First Year Reliability	Second Year Reliability	Inter-Correlation
1	P Clns Dect Bd	.565	.459	-.111
2	T Enc Ans Fact	.414	-.096	-.319
3	T Enc Int Gen	.494	-.254	.201
4	P Ans Fact	.325	-.074	-.317
5	P Ans Int Gen	.445	-.234	.204
6	P Int Att Rating	.723	.680	.550
7	T V H	.554	.740	.458
8	P V H	.686	.258	.706
9	P Non-V H	.254	.408	.434
10	T V A	.401	.393	.319
11	T Non-V A	.559	.563	.374
12	P V A	.385	.224	.411
13	P Non-V A	.131	.696	.126
14	T C	.362	.485	.249
15	F M	.606	.714	.538
16	P C	.232	.491	.195
17	A S G	.572	.129	-.054
18	P Ind	.344	.222	-.052
19	A A G	.319	.029	-.140
20	T A G	.578	-.024	-.058

that items of little utility would be dropped eventually, but not necessarily at this point of the analyses.

The question of the stability of teacher behavior over different occasions and different classes is a question of considerable interest in itself, but it is perhaps better examined in relation to later data which reports correlations over two years of factor scores derived from later factor analyses of these data.

First Factor Analysis of Process Data

The measures from Table 18 were next submitted to factor analysis, along with a series of measures derived from the Interaction Analysis. A complete list is shown in Figure 4. Again, these measures were submitted to a principle components factor analysis and varimax rotation. Although eigen values of one or larger were obtained for twelve factors, the eight factor rotation appeared to be the clearest, and that was the one used for further analysis. (Table 19).

Two uses were made of these results. The major use was to eliminate numbers of measures which were overlapping in function. For example, Factor 1 appeared to be a factor made up of different measures of indirect to direct teaching behavior. That is, the major loadings were made of the eight I/D ratios (measures 22-29) and Extended Indirect, Teacher Elaboration of Student Idea, Steady State 4-4. Disorder and Total 10 loaded oppositely. This factor, then, was used to identify one I/D ratio to take the place of all of the others. The I/D ratio for rows 8 and 9 (measure 24) was taken as that measure, since it had one of the two highest loadings, and contained more data than revised I/D ratio for row 9 (measure 23).

Figure 4

Process Measures Used in the First Factor Analysis

	Measure	Description
1	Grade	Grades 3 through 6.
	SCOR	South Carolina Observation Record
2	P Clns Dect Bd	Pupil cleans, decorates, works at board.
3	T Enc Ans Fact	Teacher encourages factual answer.
4	T Enc Int Gen	Teacher encourages interpretation, generalization, solution.
5	P Ans Fact	Pupil answers fact.
6	P Ans Int Gen	Pupil answers interpretation, generalization, solution.
7	P Int Att Rating	Pupil interest-attention rating; number of interested children and degree of interest.
8	T V H	Teacher verbal hostility.
9	P V H	Pupil verbal hostility.
10	P Non-V H	Pupil non-verbal hostility.
11	T V A	Teacher verbal affection.
12	T Non-V A	Teacher non-verbal affection.
13	P V A	Pupil verbal affection.
14	P Non-V A	Pupil non-verbal affection.
15	T C	Teacher central (other than verbal interaction - audio-visual or work at board).
16	F M	Free movement - teacher leaves, enters room, moves freely, immobilizes pupils (negatively weighted); pupil leaves, enters room, moves freely, speaks out without permission, task-oriented pupil-pupil talk.
17	P C	Pupil central (single or small groups of pupils presenting to or performing for group).
18	A S G	Autonomous social groups.
19	P Ind	Pupils as individuals.
20	A A G	Autonomous administrative groups (task-oriented groups).
21	T A G	Total autonomous groups.
	Flanders IA	Flanders Interaction Analysis
22	R I D 8	Revised ID ratio for row 8.
23	R I D 9	Revised ID ratio for row 9.
24	R I D 8 + 9	Revised ID ratio for rows 8 and 9.

Figure 4 (Continued)

Process Measures Used in the First Factor Analysis

	Measure	Description
25	R I D Total	Revised ID ratio for total.
26	ID Ratio 8	ID ratio for row 8.
27	ID Ratio 9	ID ratio for row 9.
28	ID Ratio 8 + 9	ID ratio for rows 8 and 9.
29	ID Ratio Total	ID ratio for total.
30	T A/S A	Ratio of teacher activity to student activity.
31	SS 3-3	Extended teacher elaboration of student idea. Total of 3-3 cell.
32	Ext Ind	Extended indirect teacher influence. Sum of columns 1, 2, and 3 for rows 1, 2, and 3.
33	T Elab S Idea	Sum of teacher elaboration of student idea. Sum of column 3.
34	SS 3-3/T Elab	Ratio of steady-state 3-3 to teacher elaboration of student idea. Number of tallies in 3-3 cell divided by number of tallies in 8-3 and 9-3 cells.
35	SS 4-4	Extended questioning. Tallies in 4-4 cell.
36	SS 5-5	Steady-state lecture. Sum of 5-5 cell.
37	Total Lecture	Total lecture. Sum of column 5.
38	SS T Talk	Steady-state teacher talk. Sum of tallies in the diagonal 1 through 7.
39	Tot T Talk	Total teacher talk. Sum of columns 1 through 7.
40	C C	Content cross. Sum of rows 4 and 5 minus column 10, and sum of columns 4 and 5 minus row 10, without counting the 4-4, 4-5, 5-4, and 5-5 cells twice.
41	SS 7-7	Steady-state criticism. Sum of tallies in 7-7 cell.
42	V C	Extended direct teacher influence, or vicious circle. Sum of columns 6 and7 for rows 6 and 7.
43	Tot/10	Silence or confusion. Sum of column 10.
44	Disorder	Disorder. Vicious circle plus sum of column 10.
45	S Talk ff TT	Student talk following teacher statements. Sum of columns 8 and 9 for rows 1 through 7.
46	S Talk Prolong	Student talk prolonged or non-teacher intervening. Sum of columns 8 and 9 for rows 8, 9, and 10.
47	SS S Talk	Steady-state student talk. Sum of tallies in the diagonal 8 and 9.
48	Sum of S Talk	Sum of student talk. Sum of columns 8 and 9.
49	Inflex	Inflexibility. The most cells that can be counted before reaching 10 percent of tallies.

Table 19

Rotated Factor Loadings for Two Observation Schedules
for 55 Elementary Classrooms (First Analysis)

	Measure	Factor 1	2	3	4	5	6	7	8	h²
1	Grade			-33*				37		71
	SCOR									
2	P Clns Dect Bd						33			74
3	T Enc Ans Fact			80						95
4	T Enc Int Gen							85		90
5	P Ans Fact			78						94
6	P Ans Int Gen							84		89
7	P Int Att Rating					44		32	50	86
8	T V H				42				-53	79
9	P V H								-64	75
10	P Non-V H								-76	81
11	T V A								34	81
12	T Non-V A					35		39	33	71
13	P V A				-51			53		83
14	P Non-V A					-53				68
15	T C			73						77
16	F M					-78				85
17	P C	-37	33		-54					80
18	A S G					-72	-38			93
19	P Ind			-54						73
20	A A G					-76				84
21	T A G					-87				95
	Flanders IA									
22	R I D 8	-77								89
23	R I D 9	-88								90
24	R I D 8 + 9	-87								94
25	R I D Total	-60								72
26	ID Ratio 8	-86								92
27	ID Ratio 9	-75								88
28	ID Ratio 8 + 9	-86								95
29	ID Ratio Total	-44	30							69
30	T A/S A		-85				-42			97
31	SS 3-3	-34					-59	-30		89
32	Ext Ind	-53	-34				-46		30	86
33	T Elab S Idea	-53	-39					-43	31	86
34	SS 3-3/T Elab						-76			90
35	SS 4-4	-52								62
36	SS 5-5		-57				-73			96
37	Total Lecture		-65				-67			97
38	SS T Talk		-56				-77			96
39	Tot T Talk		-82							87
40	C C		-76							82
41	SS 7-7				62				-44	82
42	V C	37		41	58					87
43	Tot/10	50				-42		30		83
44	Disorder	54				-40		34		88
45	S Talk ff TT						82	-30		92
46	S Talk Prolong		93							97
47	SS S Talk		91							95
48	Sum of S Talk		89				30			98
49	Inflex		-42			-59				84

*Decimals and values less than ±.30 are omitted.

In similar fashion overlapping items were weeded out of other factors, and the measures which loaded most heavily were carried forward for further analysis.

The other use which was made of this factor analysis was to identify two factors, as described in the Procedure Chapter, which represented teacher control of the classroom (Factor 1 was used) and a factor which represented the emotional climate of the classroom. Factor 8 was chosen as the emotional climate factor, since it appeared to be the clearest representation of emotional climate factor. As was developed in the Procedure Chapter, these two measures were chosen as analogs of two dimensions of effectiveness which have seemed in some of the small group results to be related to group effectiveness. They were used as classifications for classrooms which were treated by analysis of variance. The results will be presented in the section on the Relations between Process and Product Measures.

The results of this first factor analysis will not be interpreted, since it was computed for essentially methodological purposes. The results would inevitably be distorted as a consequence of the overlap of measures which were introduced into it.

On the basis of this first analysis twenty measures were eliminated, and ten new measures from the Flanders' _Interaction Analysis_ were added in order to clarify some of the questions raised in attempting to interpret the analysis.

Second Factor Analysis of Process Data

The rotated factor loadings for this analysis are presented in Table 20, and the list of measures which went into this analysis are shown in

Figure 5. Although the number of eigenvalues of one or larger was ten, the nine factor rotation seemed to be the clearest in meaning, so it was selected for further analysis. The factors were named as follows:

Factor 1	Teacher Criticism
Factor 2	Teacher Talk vs. Extended Pupil Talk
Factor 3	Extended Discourse vs. Rapid Teacher-Pupil Interchange
Factor 4	Pupil Freedom in Discussion
Factor 5	Not named
Factor 6	Pupil Hostility vs. Teacher Support and Pupil Interest
Factor 7	Pupil Physical Freedom
Factor 8	Indirect Teaching vs. Silence and Confusion
Factor 9	Not named.

Since the primary purpose for developing these factors was to examine them in relation to change in pupils, interpretation of the factors will be deferred for presentation in the section on the Relations between Process and Product Measures. It is clear that the factors identified here should not be interpreted as the factors which exist in classrooms, since the output of any given factor analysis depends on the measures which enter it, and since it is clear that major aspects of classroom process were not treated in this project, the cognitive aspects in particular.

The results of this analysis were reduced to factor scores by summing teacher T scores for each measure which had a loading of .5 or larger on each factor. This procedure was carried out for the process data of both years, in order to relate these process dimensions of the classrooms to pupil change over the two years. But another bit of data became available as a consequence, which is of interest in itself — the stability of the

Figure 5

Process Measures Used in the Second Factor Analysis

	Measure	Description
1	Grade	Grades 3 through 6.
	SCOR	South Carolina Observation Record
2	T Enc Ans Fact	Teacher encourages factual answer.
3	T Enc Int Gen	Teacher encourages interpretation, generalization, solution.
4	P Int Att Rating	Pupil interest-attention rating; number of interested children and degree of interest.
5	T V H	Teacher verbal hostility.
6	P V H	Pupil verbal hostility.
7	P Non-V H	Pupil non-verbal hostility.
8	T Non-V A	Teacher non-verbal affection.
9	P V A	Pupil verbal affection.
10	P Non-V A	Pupil non-verbal affection.
11	T C	Teacher central (other than verbal interaction - audio-visual or work at board).
12	F M	Free movement - teacher leaves, enters room, moves freely, immobilizes pupils (negatively weighted); pupil leaves, enters room, moves freely, speaks out without permission, task-oriented pupil-pupil talk.
13	P C	Pupil central (single or small groups of pupils presenting to or performing for group).
14	A S G	Autonomous social groups.
15	P Ind	Pupils as individuals.
16	T A G	Total autonomous groups.
	Flanders IA	Flanders Interaction Analysis
17	R I D 8 + 9	Revised ID ratio for rows 8 and 9.
18	T A/S A	Ratio of teacher activity to student activity.
19	SS 3-3	Extended teacher elaboration of student idea. Total of 3-3 cell.
20	Ext Ind	Extended indirect teacher influence. Sum of columns 1, 2, and 3 for rows 1, 2, and 3.
21	T Elab S Idea	Sum of teacher elaboration of student idea. Sum of column 3.
22	SS 4-4	Extended questioning. Tallies in 4-4 cell.

Figure 5 (Continued)

Process Measures Used in the Second Factor Analysis

	Measure	Description
23	SS 5-5	Steady-state lecture. Sum of 5-5 cell.
24	SS 7-7	Steady-state criticism. Sum of tallies in 7-7 cell.
25	V C	Extended direct teacher influence, or vicious circle. Sum of columns 6 and 7 for rows 6 and 7.
26	Tot/10	Silence or confusion. Sum of column 10.
27	S Talk ff TT	Student talk following teacher statements. Sum of columns 8 and 9 for rows 1 through 7.
28	S Talk Prolong	Student talk prolonged or non-teacher intervening. Sum of columns 8 and 9 for rows 8, 9, and 10.
29	Sum of S Talk	Sum of student talk. Sum of columns 8 and 9.
30	Flex	Flexibility - beginning with largest cell frequencies, a count of cells necessary to account for 60 percent of tallies.
31	Drill	Drill. Sum of 4-8 and 8-4 cells.
32	Inquiry	Inquiry. Sum of 3-3, 4-4, 8-8, and 9-9 cells.
33	Inq/Dr Ratio	Inquiry/drill ratio.
34	Pupil Inter	Pupil interrupts. Tallies in 5-9 cells.
35	Broad Ans	Broad answer. Sum of 4-9 and 10-9 cells.
36	P Initi ff T Ind	Pupil initiation following teacher indirect. Sum of 1-9, 2-9, 3-9, and 5-9 cells.
37	P Initi ff T Dir	Pupil initiation following teacher direct. Sum of 4-9 and 6-9 cells.
38	P Initi ff T Crit	Pupil initiation following teacher criticism. Tallies in 7-9 cell.
39	Rev Dis	Revised disorder score. Sum of vicious circle, 10-6 and 10-7 cells.

Table 20

Rotated Factor Loadings for Two Observation Schedules for 55 Elementary Classrooms (Second Analysis)

		Factor									
	Measure	1	2	3	4	5	6	7	8	9	h^2
1	Grade		-30*		-48					31	71
	SCOR										
2	T Enc Ans Fact					-50				30	73
3	T Enc Int Gen									61	77
4	P Int Att Rating						-65	37			87
5	T V H	-76									86
6	P V H				-30		66				83
7	P Non-V H						79				83
8	T Non-V A						-56				71
9	P V A									75	83
10	P Non-V A							-70			81
11	T C				42	-46					79
12	F M							-72			84
13	P C									56	82
14	A S G					-32	34	-72			96
15	P Ind				-52	31					73
16	T A G							-82			94
	Flanders IA										
17	R I D 8 + 9	30				42			49		82
18	T A/S A		83	42							98
19	SS 3-3								75		88
20	Ext Ind		30						77		89
21	T Elab S Idea		30						66		88
22	SS 4-4								59	38	74
23	SS 5-5		50	80							97
24	SS 7-7	-83									87
25	V C					-84					93
26	Tot/10				-39	-38			-54		89
27	S Talk ff TT			-92							98
28	S Talk Prolong		-94								99
29	Sum of S Talk		-89								99
30	Flex					-54	-62				91
31	Drill			-81	46						95
32	Inquiry		-93								98
33	Inq/Dr Ratio		-77	60							98
34	Pupil Inter				-86						92
35	Broad Ans				-64				-30	39	92
36	P Ini ff T Ind				-89						93
37	P Ini ff T Dir				-57			35			77
38	P Ini ff T Crit	-74			-37						88
39	Rev Dis					-86					94

*Decimals and values less than ±.30 are omitted.

various measures of classroom process for the same teachers over two years and for two classes. (Table 21). Other studies have indicated indirectly that teacher behavior tends to be relatively stable. The Anderson and Brewer studies describe the same teacher with different classes as behaving in similar fashion and producing similar kinds of behavior on the part of pupils. Simon (1966) found generally similar patterns of measures from Flanders' Interaction Analysis for teachers teaching preferred and nonpreferred classes concurrently. Although the general trend was for similar results across the two classes, some measures did differ to a degree from one class to another. Pfieffer (1966) found similar patterns of teaching behavior for five teachers for Interaction Analysis measures for classes differing in ability level. These studies tested significance of difference of teacher behavior along a number of dimensions, however, so the data here differ somewhat in nature.

It is of interest to note that the measures vary from those with a relatively high degree of consistency, such as that of Teacher Criticism, to others which have no relationship from one year to another. They suggest, at least, that the consistency of teacher behavior is a function of the particular dimension of teacher behavior being examined -- that some behaviors may be quite consistent but others may show no consistency at all. There is the additional question of whether the lack of agreement from one year to another is one of adaptation of the teacher's behavior to the needs of the pupils she is working with, or whether it is a less functional lack of consistency. On the other hand, it appears clear from other results in this study, that Teacher Criticism as measured here is non-functional for pupils in general, yet it does not appear to have

Table 21

Stability of Process Factor Scores Over Two Years

Factor	Description	r
1	Teacher Criticism	.60
2	Teacher Talk vs Extended Pupil Talk	.32
3	Extended Discourse vs Rapid Teacher-Pupil Interchange	.49
4	Pupil Freedom in Discussion	.42
5	Unnamed	-.01
6	Pupil Hostility vs Teacher Support and Pupil Interest	.56
7	Pupil Physical Freedom	.36
8	Indirect Teaching vs Silence and Confusion	.33
9	Unnamed	.31

varied widely for classes from one year to the other.

Summary of Process Measure Reduction

Items from SCOR were first reduced by analysis of reliability, then forty-nine measures from it and Interaction Analysis were factor analyzed to identify overlapping measures. Twenty measures were eliminated, ten new ones added, and these thirty-nine measures factor analyzed again. These latter results were presented but not interpreted, and were used to produce factor scores for each teacher on each dimension.

At this point in the analysis of data, both process and product data had been reduced to a form in which it was possible to analyze relations between process data and change in pupils associated with a year in a particular classroom. This is the next topic for discussion.

Relations Between Process and Product Measures

Analyses of Climate and Control in Relation to Pupil Growth

Analysis of Pupil Growth During the Year. As indicated in the procedure chapter and in the section on the reduction of the process measures in this chapter, two factors from the first factor analysis of the process data were identified which represented a dimension of control of the pupils in the classroom, and the emotional climate in the classroom. The first was Factor 1, the indirect/direct factor; the second was Factor 8, the factor of hostility expression. The I/D ratio for rows 8 and 9 was used as the measure of the first of these, and an incomplete factor score using five measures of teacher and pupil expression of hostility in the classroom was used as the measure for the second. Using these two measures, then, four classrooms were identified at each grade level representing the four combinations of high control-high hostility, high control-low hostility, low control-high hostility, and low control-low hostility. This resulted in the selection of sixteen classrooms, two levels of control, two levels of climate, and four grade levels, three through six. Analyses of variance were then carried out to test differences in change in pupils for the first year of the project for scores on three measures of creativity, and for Vocabulary and Reading. Analyses for creativity were carried out prior to the point in processing at which adjustment for initial standing had been completed so that these scores are true gain scores, which have been adjusted for regression effects. Vocabulary and Reading were adjusted for initial standing as well, and are residual true gain scores.

The results for growth in Vocabulary were as expected (Table 22). Indirect teaching produced greater growth than direct; classrooms in which there was greater expression of hostility produced less learning than those with warmer emotional climate; and the combination of indirect teaching and low hostility produced the greatest gain of all. Grade level was also a significant factor in the development of Vocabulary, with less growth in the fourth grade than any other. This is reminiscent of the "fourth grade slump" in creativity mentioned earlier.

The results for Reading were not clear-cut, however, and present some problems in interpretation (Table 23). Differences in emotional climate did not produce differences in reading growth, nor were there differences from grade to grade. Consistent with the findings for Vocabulary, however, indirect teaching produced greater growth than direct.

Table 22

Analysis of Variance for Vocabulary Residual True Gain Scores for Sixteen Elementary Classrooms

Analysis of Variance

Source of Variation	df	Mean Squares	F
A Hostility	1	167.17	10.22**
B Control	1	131.08	8.01**
C Grade	3	107.57	6.57**
AxB	1	105.20	6.43*
CxB	3	65.97	4.03**
AxC	3	16.22	----
AxBxC	3	72.53	4.43**
Error	417	16.36	
Total	432		

*$p < .05$
**$p < .01$

Residual True Gain Means[a]

		Grade Level				
		3	4	5	6	Total
Hostility	High	6.58	5.78	7.91	7.24	6.87
	Low	7.73	6.51	8.80	9.40	8.22
	Total	7.17	6.10	8.38	8.39	7.55
Teacher Control	Direct	6.35	5.59	6.84	8.57	6.92
	Indirect	7.73	6.69	9.78	8.15	8.18
	Total	7.17	6.10	8.38	8.39	7.55

		Teacher Control		
		Direct	Indirect	Total
Hostility	High	5.80	7.97	6.87
	Low	8.06	8.37	8.22
	Total	6.92	8.18	7.55

[a] In grade-level months.

Table 23

Analysis of Variance for Reading Residual True Gain Scores for Sixteen Elementary Classrooms

Analysis of Variance

Source of Variation	df	Mean Squares	F
A Hostility	1	36.72	----
B Control	1	183.28	4.32*
C Grade	3	29.57	----
AxB	1	1732.21	40.81**
BxC	3	29.04	----
AxC	3	70.44	1.66
AxBxC	3	121.11	2.85*
Error	417	42.45	
Total	432		

*p<.05
**p<.01

Residual True Gain Means[a]

		Grade Level				
		3	4	5	6	Total
Hostility	High	5.21	6.46	5.38	6.51	5.91
	Low	5.31	4.13	5.28	5.69	5.15
	Total	5.26	5.42	5.32	6.07	5.52
Teacher Control	Direct	4.25	4.66	4.35	6.20	4.94
	Indirect	5.95	6.29	6.21	5.92	6.09
	Total	5.26	5.42	5.32	6.07	5.52

		Teacher Control		
		Direct	Indirect	Total
Hostility	High	3.39	8.50	5.91
	Low	6.52	3.88	5.15
	Total	4.94	6.09	5.52

[a] In grade-level months.

Surprisingly, the greatest differences occured under the joint influence of climate and control; with indirect, high-hostile classrooms producing greatest growth, and direct, high-hostile the least growth. This does not square with the hypothesis that both indirect teaching and a supportive emotional climate should produce greater learning.

Yet a tentative post hoc reconciliation of the results can be formulated, although it, like all post hoc explanations, is only a further hypothesis. There are two problems to deal with -- why the results for Reading and Vocabulary differ, and why presumed less-than-optimal combinations of conditions produced most growth in Reading. If,however, we refer to the principle of simpler learning being facilitated by moderate levels of tension, which hinder more complex learning, as the studies on anxiety discussed in Chapter 2 indicate (Castaneda, Palermo, and McCandless, 1956), we would be led to infer that the learning of reading, as measured here, is a less abstract function than learning vocabulary. This is a difficult assumption to accept, and yet examination of the two tests makes this seem plausible -- the Vocabulary items seem to deal often with abstractions (very few of the words are nouns, for example) whereas the Reading items appear to deal with relatively concrete ideas. If this assumption is accepted, then the interpretation would follow that the reading skills tested were enough less abstract that they were facilitated by a somewhat higher level of tension than was vocabulary. Related to this interpretation is the feeling of observers that these were schools, as a group, which were warmer and more supportive than many. By this hypothesis, if either the schools had been less supportive on the average (more tension producing), or if the test had measured more abstract reading functions, the results might have been as expected.

Perhaps another distinction may be made which may be related to the differences — the idea of "inner-directed" vs. "teacher-directed" learning. The field staff supervisor agrees that vocabulary was not so directly taught in these classrooms as reading, supporting the idea of more "inner-directed" learning.

Perhaps this kind of "inner-directed" learning is more easily influenced by both the climate and control aspects of the classroom, and an indirect, low-hostile classroom may create in the children a greater eagerness or desire to learn on their own. In contrast, the reading skills measured here may be ones which can be more directly teacher taught, and teacher influence replaced "inner-direction."

Perhaps there is a further question — that of whether more complex, more abstract, higher-level kinds of learning are not of necessity more "inner-directed," rather than "outer" or "teacher-directed." It may be that the learning which involves the child's own motivation and interest is the learning which is most affected by the nature of the classroom.

Another possible explanation of the different results may be that the teaching of reading is more nearly "programmed" by the materials and the procedures favored by school systems, and taught by colleges of education. Almost surely it is more programmed than the teaching of vocabulary. And it seems reasonable that the more tightly programmed the teaching of a subject matter is, the less difference between teachers should affect pupil achievement. The significant hostility-control interaction argues against this as a complete explanation, however.

A consistent finding for all three of the creativity measures (Tables 24-26), was that Grade Level was the most significant influence on the development of creativity, rather than either of the dimensions of classroom behavior; but the grade levels at which maximum growth took place differed from creativity measure to creativity measure. It should be remembered that each score represents growth from fall to spring rather than year-end standing. The fourth grade slump,as such, did not appear (a decrease in performance would result in a negative score), although periods of decreased growth did appear to follow the pattern of the fourth grade slump in some of the data. This was not entirely unexpected, since the schools in which the data were collected were not characterized by a sharp discontinuity between the third and fourth grades as is often true. (Torrance, 1962b). Rather, pupils continued to have the same seating arrangements they had in the third grade, to have much of the freedom of the previous years, and there did not appear to be sharp differences in teacher attitudes toward pupils from the lower to the intermediate grades. What changes there were seemed to be ones of curricular emphasis, in which there was more attention to reading to learn, rather than learning to read; and separate subjects were more likely to be met, rather than broad subject matter areas.

Rather than showing a fourth grade slump, Non-Verbal Creativity appeared to show most growth at the fourth grade (see Table 24). Further, this growth was greater under high hostility than low, a trend which was only reversed for the sixth grade, with a resulting

Table 24

Analysis of Variance for Non-Verbal Creativity True Gain Scores in Sixteen Elementary Classrooms

Analysis of Variance

Source of Variation	df	Mean Squares	F
A Hostility	1	18.09	1.63
B Control	1	19.03	1.71
C Grade	3	173.78	15.63**
AxB	1	3.50	----
CxB	3	34.03	3.06*
AxC	3	75.52	6.79**
AxBxC	3	59.72	5.37**
Error	418	11.12	
Total	433		

*$p < .05$
**$p < .01$

True Gain Means

		Grade Level				
		3	4	5	6	Total
Hostility	High	2.96	5.95	2.43	1.53	3.29
	Low	2.65	3.81	1.77	3.34	2.83
	Total	2.81	5.00	2.08	2.50	3.05
Teacher Control	Direct	3.44	4.41	1.49	2.18	2.82
	Indirect	2.36	5.65	2.60	2.90	3.29
	Total	2.81	5.00	2.08	2.50	3.05

		Teacher Control		
		Direct	Indirect	Total
Hostility	High	3.08	3.52	3.29
	Low	2.56	3.08	2.83
	Total	2.82	3.29	3.05

Table 25

Analysis of Variance for Product Improvement True Gain Scores in Sixteen Elementary Classrooms

Analysis of Variance

Source of Variation	df	Mean Squares	F
A Hostility	1	4.82	----
B Control	1	30.64	3.84
C Grade	3	170.75	21.41**
AxB	1	11.01	1.38
BxC	3	9.04	1.13
AxC	3	33.21	4.16**
AxBxC	3	83.68	10.49**
Error	418	7.97	
Total	433		

**p<.01

True Gain Means

		Grade Level				
		3	4	5	6	Total
Hostility	High	7.45	7.21	6.86	4.98	6.65
	Low	7.78	8.91	5.84	5.33	6.82
	Total	7.63	7.98	6.32	5.17	6.73
Teacher Control	Direct	6.98	7.86	6.42	4.69	6.41
	Indirect	8.07	8.10	6.22	5.77	7.05
	Total	7.63	7.98	6.32	5.17	6.73

		Teacher Control		
		Direct	Indirect	Total
Hostility	High	6.38	6.92	6.65
	Low	6.45	7.16	6.82
	Total	6.41	7.05	6.73

Table 26

Analysis of Variance for Unusual Uses True Gain Scores in Sixteen Elementary Classrooms

Analysis of Variance

Source of Variation	df	Mean Squares	F
A Hostility	1	0.89	----
B Control	1	86.58	1.91
C Grade	3	668.27	14.74**
AxB	1	146.20	3.23
BxC	3	30.30	----
AxC	3	346.47	7.64**
AxBxC	3	186.93	4.12**
Error	418	45.33	
Total	433		

**p < .01

True Gain Means

		Grade Level				
		3	4	5	6	Total
Hostility	High	9.53	2.71	3.84	10.04	6.32
	Low	4.82	7.17	5.44	9.36	6.71
	Total	7.14	4.71	4.70	9.68	6.51
Teacher Control	Direct	7.39	3.98	3.70	9.36	6.09
	Indirect	6.95	5.53	5.59	10.08	6.93
	Total	7.14	4.71	4.70	9.68	6.51

		Teacher Control		
		Direct	Indirect	Total
Hostility	High	5.34	7.33	6.32
	Low	6.85	6.57	6.71
	Total	6.09	6.93	6.51

significant interaction. The interaction of Control with grade level was significant at the five per cent level, with higher gain under direct control in the third grade, but under indirect control for the other grades. This latter finding seems very reasonable.

The finding of greater growth of non-verbal creativity under direct teaching parallels the Wodtke and Wallen (1965) finding of greater non-verbal creative growth under "high control" teachers, in contrast to verbal creativity, which grew most under "low control" teachers.

The grade-level effect for Product Improvement was associated with a trend toward decreasing growth in the fifth and sixth grades (Table 25). Again, rather than a fourth grade slump appearing, the highest gain was found in the fourth grade, although the third grade was similar. Questions of feasibility and practicality were ruled out in the instructions, but it seems very possible that older children, with their increasing peer-group pressure and self-criticism, were less likely to record "silly" ideas like "Make him learn to drive a car," which earned credit. The grade-level effect emerged still more clearly under low hostility, with a significant interaction. Probably this trend appeared because written responses became easier as pupils grew older, and the crossover point between this facilitating influence and the inhibiting influence cited above came at the fourth grade. Apparently it was only under low hostility that this facilitating influence emerged in the lower grades.

The main effect for Control closely approached significance at the five per cent level (an F of 3.84 instead of the 3.86 required), with the greater gain occurring under indirect teaching.

A pattern like the fourth grade slump did appear in the Unusual Uses test (Table 26), with the main effect for Grade Level again significant. The Hostility-Grade Level interaction was significant at the one per cent level, as in the other analyses, and it was here that the fourth grade slump emerged most clearly. Under high hostility, there was a sharp decline in growth at the fourth grade, a slight gain at the fifth, and a sharp gain at the sixth; whereas under low hostility, there was greater gain at the fourth than at the third. Although not significant, the same tendency can be seen for the fourth grade slump to appear under direct teaching, but less clearly under indirect.

For all three measures, the triple interactions were significant, presumably reflecting the same influences discussed above.

These results for creativity can be better integrated into a meaningful whole by examining background factors in the fourth grade slump. One factor hypothesized is that of general tension level within the individual, which is presumed to be high at the fourth grade level (as well as at several other points), and lower in the two later grades, as a consequence of discontinuities of the school culture (Torrance, 1962b). This would account for the frequency with which the fourth grade was associated with change in the growth trend across grade levels.

An additional factor may be differences in the way the measures are affected by individual tensions and environmental pressures. Just as the learning of simple tasks was found to be facilitated by a level of anxiety which hindered learning of more complex tasks, Non-Verbal Creativity may be less hampered or even facilitated by stresses which lessened creative development in the other tasks. The similarity of the Non-Verbal Creative tasks to "doodling," often a response to tension, is suggestive.

Since the level of tension was apparently less in the schools studied here than is often true, there was an increase in performance on the Non-Verbal tasks, but still lessened growth for the more demanding tasks, e.g., Unusual Uses, and an intermediate trend for Product Improvement.

The differential effect of environmental pressures on the creativity measures is *post hoc*, but the remainder of the interpretation appears to fit satisfactorily with previous research and theory.

The failure of grade-level to affect growth in Reading may partly be attributed to the fact that grade-level norms were used for the achievement measures, yet the fact that grade-level did interact with Vocabulary growth despite grade-norming squares perfectly with the interpretation of Reading as a less abstract task which was less affected by stress differences.

Perhaps the failure of the main effects for Climate and Control to show significant differences in creativity growth can be explained as a consequence of the creativity measures being less refined and sensitive to influence than the achievement measures, but more sensitive to grade level effects because they were not grade-normed. This interpretation would then assume that grade-level *in these schools* was the major influence, and teacher differences in Climate and Control less influential. The achievement tests are assumed to be the more refined and sensitive, but that grade-level effect for them was largely normed out.

Perhaps the surprising finding should be the pattern of fourth grade slump for Vocabulary.

Summary of Learning During the Year. The relation of three independent variables, Teacher Control, Hostility, and Grade Level were studied in relation to pupil growth in Vocabulary, Reading, and three measures of creativity each in a 2x2x4 factorial analysis of variance.

For Vocabulary, a pattern like the fourth grade slump appeared for grade level, and indirect teaching and low Hostility and their interaction produced greater growth. For Reading, indirect teaching produced greater growth, but the combinations of indirect high-hostile and direct, low-hostile were superior in interaction.

For Creativity, a significant main effect was found only for Grade Level, but there was a significant interaction of Hostility and Grade Level in each analysis. For Non-Verbal Creativity, the Teacher Control-Grade Level interaction was significant as well.

An interpretation of the five analyses was proposed in terms of greater effect of Grade Level in these classrooms, which was largely normed out of the achievement tests which were proposed as the more sensitive measures. The patterns of results were interpreted in terms of tension levels, peer group pressures, and differing interactions of task difficulty with tension.

Analysis of Pupil Change During the Summer. In the course of the preceding analyses, examples emerged of pupil growth during the summer, as compared with school year growth, which prompted further analysis of the effect of classroom environment.

As was described in the procedure chapter, the achievement measures were administered by project staff in the fall and spring of the first year, and spring of the second year. Testing was not planned for the fall of the second year, but a school testing program in the sixth grade in three of the four schools, using the same tests, provided scores at this point. From these data, relative growth for the two school years and the intervening summer were obtained.

Influence of Classroom Process on Summer Learning. In order to study summer growth in relation to the process characteristics of the preceding year's classroom, the same dimensions of Climate and Control were used as in the preceding analyses.

In the preceding analyses, four classrooms were selected from each grade level, three through six, representing the extreme combinations of Climate and Control. In the present study, data were available for growth during the summer between the fifth and sixth grades for three of the original four classrooms, and a replacement for the fourth was selected on the same basis.

Residual true gain scores were calculated for the summer for each pupil and subtracted from his residual true gain for the calendar year which had been calculated earlier. Scores were then available for three periods: the first school year, the next summer, and the second school year.

The summer gain scores were analyzed by a two-factor analysis of variance for unequal and disproportionate N's using the Climate and Control dimensions as classifications, and using each of the measures of Vocabulary, Reading, Arithmetic Concepts, and Arithmetic Problems as the measure of change for study.

The results for Vocabulary partly conformed to expectation, but in part did not (see Table 27). Differences in emotional climate for the preceding year's classroom produced no significant differences in growth over the summer, but differences in teacher control produced a significant

Table 27

Analysis of Variance for Vocabulary Summer Growth for Two Classroom Behavior Dimensions

Analysis of Variance

Source of Variation	df	Mean Squares	F
A Hostility	1	0.06	----
B Control	1	98.10	4.22*
AxB	1	0.85	----
Error	68	23.22	
Total	71		

$^*p < .05$

Residual True Gain Means[a]

		Teacher Control		
		Direct	Indirect	Total
Hostility	High	3.00	5.58	4.22
	Low	3.24	5.36	3.96
	Total	3.12	5.51	4.11

[a] In grade-level months.

difference in favor of indirect control -- the children in direct classrooms grew slightly more than three months during the summer, while pupils from indirect classrooms grew five and a half. The interaction of the two factors was not significant.

For Reading, emotional climate, control, and interaction were all non-significant (Table 28). The only differences in growth large enough to be of possible interest were differences between cells of the analysis, in which somewhat higher growth occurred for the combinations of low hostility-direct and high hostility-indirect than for the other two combinations, although these differences may be chance ones.

The finding that indirect teaching in a classroom during the school year produced significantly higher Vocabulary growth the following summer follows the same pattern as for growth during the year. The significantly higher growth associated with low hostility which was found for the academic year was not found for the subsequent summer, however; nor was the significant interaction in which indirect teaching and low hostility produced the maximum of growth. It is interesting to find that at least one aspect of teaching which fostered growth during the year fostered continued growth following the classroom experience.

It is not certain why indirect teacher control produced more Vocabulary learning during the summer -- whether the experience of greater pupil involvement in the classroom led to later learning, or whether the freedom and openness in examining ideas was the supportive element, or both.

Although the results for Reading were not statistically significant, they followed the pattern for growth during the year in some respects.

Table 28

Analysis of Variance for Reading Summer Growth for Two Classroom Behavior Dimensions

Analysis of Variance

Source of Variation	df	Mean Squares	F
A Hostility	1	0.02	----
B Control	1	3.22	----
AxB	1	23.41	----
Error	68	13.39	
Total	71		

Residual True Gain Means[a]

		Teacher Control		
		Direct	Indirect	Total
Hostility	High	2.80	3.37	3.07
	Low	3.71	1.90	3.09
	Total	3.26	2.83	3.08

[a] In grade-level months.

During the year, indirect teacher control produced more growth than direct, but this effect was not shown during the summer. The emotional climate dimension did not produce significant differences in either case. The largest difference in learning during the year was in the joint effect of Climate and Control (significant beyond the one per cent level), and although the interaction was not significant for summer gain, the pattern was the same. The tendency for Reading to be less affected by classroom conditions was also parallel.

For Arithmetic Concepts and Problems, (Tables 29 and 30) only the interaction of Climate and Control was significant. For Arithmetic Concepts, the combination of low hostility- indirect produced the greatest growth, although high hostility- direct was not the combination apparently producing least growth, in terms of the differences between low hostility- indirect, and the other three means. For Arithmetic Problems, the greatest growth was again for low hostility -indirect, with high hostility -direct intermediate, and the other two combinations producing less learning. Both of these patterns seem more like that for Vocabulary than that for Reading, both for the previous year and the summer, but the parallel is not close.

The results for Vocabulary appear to be ones in which the combination of two optimal classroom conditions produced more growth than either alone. The maximum growth for both arithmetic measures appeared to follow this pattern, although the other combinations do not always follow in the expected order. But the results for Reading appear in both cases to support the interpretation that the combination of (presumed) optimal and non-optimal conditions produces the most learning.

The direction of this difference appears to require an interpretation which is more complex than a simple summative effect of two

Table 29

Weighted Means Analysis of Variance for Arithmetic Concepts Summer Growth for Two Behavior Dimensions

Analysis of Variance

Source of Variation	df	Mean Squares	F
A Hostility	1	0.003	----
B Control	1	0.004	----
AxB	1	41.95	8.45**
Error	68	4.96	
Total	71		

**p <.01

Residual True Gain Means[a]

		Teacher Control		
		Direct	Indirect	Total
Hostility	High	3.10	2.89	3.00
	Low	2.76	5.73	3.78
	Total	2.93	3.93	3.35

[a] In grade-level months.

Table 30

Weighted Means Analysis of Variance for Arithmetic Problems Summer Growth for Two Behavior Dimensions

Analysis of Variance

Source of Variation	df	Mean Squares	F
A Hostility	1	0.002	----
B Control	1	0.0002	----
AxB	1	209.93	15.64**
Error	68	13.42	
Total	71		

**p <.01

Residual True Gain Means[a]

		Teacher Control		
		Direct	Indirect	Total
Hostility	High	6.86	3.84	5.42
	Low	4.57	8.64	5.97
	Total	5.71	5.60	5.67

[a] In grade-level months.

optimal conditions.

The findings for the year were interpreted by a post hoc hypothesis which dealt with two problems -- why the results for Reading and Vocabulary differed, and why presumed less-than-optimal combinations of conditions produced the greatest growth in Reading. That interpretation was made by referring to the finding of simpler learning being facilitated by moderate levels of tension which hindered more complex learning.

The pattern for Reading for summer gain appears to fit this interpretation as well as that for the previous year. Perhaps it is also relevant that the Arithmetic Concepts measure appears more clearly than the Problems measure to follow the pattern for Vocabulary. It would be reasonable to assume that Concepts is a more abstract measure than Problems and this may be why it parallels Vocabulary more closely.

The standing of the pupils in this subgroup at each of the testing periods is shown in grade-level norms in Table 31, and in residual gain in grade level months in Table 32. Although the results differ somewhat from one to the other, in general the relative growth for Vocabulary was approximately 8 months for the first year, four months for the intervening summer, and 7-1/2 months for the second year. For Reading, the same periods showed approximately 6-1/2, 3-1/2,and 6-1/2 months; for Arithmetic Concepts, 6-1/2, 3, and 7-1/2; and for Problems, approximately 7, 5, and 8.

In interpreting the tables, the relative amount of growth shown for the summer as contrasted to the two school years needs some qualification. The schedule for testing did not permit encompassing the whole nine months of the school year between tests -- rather the period was approximately seven months. The summer, then, covered about five months

Table 31

Longitudinal Results* for Two Years of Growth for 189 Pupils

Fifth Grade

Measure	Fall, 1962 Mean	Fall, 1962 Standard Deviation	Spring, 1963 Mean	Spring, 1963 Standard Deviation
Vocabulary	63.6	14.17	71.5	15.89
Reading	62.9	14.54	69.5	17.88
Arithmetic Concepts	56.8	8.05	63.3	8.30
Arithmetic Problems	56.3	9.20	62.6	11.90

Sixth Grade

Measure	Fall, 1963 Mean	Fall, 1963 Standard Deviation	Spring, 1964 Mean	Spring, 1964 Standard Deviation
Vocabulary	75.5	16.92	83.2	16.17
Reading	73.0	15.18	79.7	15.65
Arithmetic Concepts	66.2	8.34	73.8	9.97
Arithmetic Problems	67.5	11.16	76.5	13.39

*In grade-level months.

Table 32

Residual True Gain* for Three Periods of Growth for 189 Pupils

Measure	Fifth Grade Fall to Spring		Summer		Sixth Grade Fall to Spring	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Vocabulary	8.1	4.84	4.0	5.14	7.2	4.23
Reading	6.4	6.95	3.5	4.05	6.9	4.13
Arith. Concepts	6.7	2.33	3.0	2.31	7.6	3.03
Arith. Problems	6.8	3.25	4.9	3.46	8.1	4.66

*In grade-level months.

which included the opening and closing month of two school years. In addition, the year began with a review of the previous year's work which presumably resulted in an advantage for the fall testing which followed. It is possible, as well, that the second fall testing which was done by the classroom teacher rather than an outsider, may have resulted in somewhat higher scores, because of a less stressful situation.

Despite all of these questions, it still seemed quite possible that an amount of growth took place during the summer months, which was large enough to be of practical importance. This was at first surprising, but there is some support for it in the literature. Schrepel and Laslett (1936) found growth over the summer in fourteen out of twenty-two subtests. They commented as well that brighter pupils tended to show greater amounts of gain, and both they and Word and Davis (1938) comment on the greater likelihood of growth over the summer in material involving concepts, understanding, or application of principles, in contrast to factual learning which was more likely to show a decline. A recent study in the Baltimore County Schools (Gabriel, 1966) showed losses in most of the classrooms studied, but found growth had occurred for the pupils from a small number of classrooms. They comment: "In certain schools, the teacher influences the students' retention of knowledge and skills over the summer. The reasons for this are not clear, and few conclusions can be drawn from this part of the study." (p. 23)

The results from this project appear to fit very well into the findings of others and perhaps extend them. It is clear that these are advanced pupils, and the _Iowa Tests of Basic Skills_ were chosen because they were believed to measure higher level skills rather than factual information. These results do appear to extend previous understanding in indicating that at least one aspect of classroom process during the school year does make a significant difference in the amount of growth that occurs in the pupils the following summer. And there is some support for the idea that the emotional climate of the classroom contributes to and/or interacts with indirect teaching in influencing the amount of growth that occurs.

Individual Differences in Summer Gain

The variability associated with the summer growth (Table 32) suggested that there might be pupils who grew as much or more during the summer than for either school year. Inspection of the data showed examples of what appeared to be individual differences in the periods within which a pupil tended to show most of his growth. It was easy to find examples of pupils who grew at the expected rate during both school years but little or not at all during the intervening summer. But examples of the reverse pattern were easy to find, however. There was the pupil who entered the fifth grade reading at the 88 level, and with vocabulary at the 91 level, who grew five months in Vocabulary the first year, and two in Reading. During the summer, he grew seven in each without specific educational stimulation; but the second year he grew four months in Reading, and not at all in Vocabulary. And his was not an extreme pattern.

In the attempt to discover whether these were isolated cases a count was made of individual children whose summer gain was as much or more than their previous year's gain, with the finding that this was true for 33 percent of the group for Vocabulary and 43 per cent for

Reading. A portion of each of these percentages presumably represents unreliability of measurement (as well as the factors cited above) but the possibility of consistent patterns, or "styles of learning" still seemed a real one, and provocative in the extreme. As a way of testing whether such a pattern existed, the gain scores for the three periods were intercorrelated.

The prediction was made that if pupils really differed in their preferred mode of learning, there would be positive correlations between Vocabulary and Reading within each time period, and between the first year and the second year, but that both years should correlate negatively with summer growth.

It was recognized that the values of the correlations would be likely to be quite low, since the gain scores under analysis lack the large, stable element which looms large in the comparison of status scores. If, as Thorndike (1966) suggests, the correlation of initial status with gain is probably on the order of +.10, then it would not be reasonable to expect two measures of gain to correlate very highly, especially when gains in different subject-matters are involved. Accordingly, the predictions were made only for the signs of the correlation coefficients.

The analysis of the three periods of gain for the verbal tests (Table 33) produced fifteen correlation coefficients, every one of which was in the predicted direction. This is a result which could occur by chance less than one time in a thousand, as indicated by the sign test. A similar analysis for the arithmetic measures (Table 34) produced eleven of fifteen signs in the predicted direction, which was not significant

Table 33

Correlations of Vocabulary and Reading Residual True Gain for Three Time Periods*

		First Academic Year		Summer		Second Academic Year	
Measure		Vocab. 1	Read. 2	Vocab. 3	Read. 4	Vocab. 5	Read. 6
Vocabulary	1	---	.33	-.37	-.11	.25	.11
Reading	2		---	-.13	-.39	.13	.06
Vocabulary	3			---	.30	-.85	-.12
Reading	4				---	-.19	-.41
Vocabulary	5					---	.11
Reading	6						---

* N = 189, fifth-sixth grade pupils.

Table 34

Correlations of Arithmetic Concepts and Problems Residual True Gain for Three Time Periods*

Measure		First Academic Year		Summer		Second Academic Year	
		Con. 1	Prob. 2	Con. 3	Prob. 4	Con. 5	Prob. 6
Concepts	1	---	.34	-.26	-.09	-.06	.15
Problems	2		---	-.04	-.26	-.05	-.10
Concepts	3			---	.37	-.22	-.04
Problems	4				---	.05	-.23
Concepts	5					---	.34
Problems	6						---

*N = 189, fifth-sixth grade pupils.

($P < .06$). When the two sets of results are pooled, twenty-six of thirty signs were in the predicted direction, which is significant beyond the one tenth of one per cent level. It is perhaps worthy of note that more negative than positive correlations were predicted. When the total matrix was constructed, the predictions were validated beyond the one per cent level, although the pattern was not as clear as those in the two tables for verbal and quantitative measures.

These results suggest that perhaps we can posit two groups of learners (probably the extremes of a continuum) -- the conventional learner who does most of his learning in the classroom under the teacher's direction, and another (the summer learner?) who does most of his learning during the summer, on his own.

There is evidence of what may be a similar continuum of differences in learning styles identified by Torrance (1965). He cites results from several studies which can be interpreted as pointing to two pupil styles of learning -- learning by authority and learning by discovery. When one style or the other was favored by instructional procedures or examinations, different sets of pupils did well, and correlations with measures of intelligence were significantly different.

While it is not clear that the continuum of differences identified by Torrance is the same one apparently effective here, the two sets of results do appear to support each other in agreeing that different styles of learning exist.

Perhaps the finding of summer learning should not be surprising since educators have always expressed the hope of initiating a learning process which will be continued beyond formal schooling. The possibility that practically important amounts of growth for some pupils may occur outside the school year raises some provocative questions, however. Lacking information about summer growth, as the school usually does, is it not likely that a pupil following such a pattern would be labeled an "underachiever"?

Is it possible that some children are more self-directed learners than others and so continue learning on their own during the summer?

Is it possible that some children find the classroom a source of stimulation which later results in growth, but requires a period of time for something like integration, synthesis, or consolidation?

Is it possible that a part of the progressive falling behind which is typical of the culturally deprived child occurs because of lack of environmental support for out-of-school learning?

Is it possible that the concept of good teaching needs more emphasis placed on the potential of the classroom for initiating learning which continues later? This has been a part of theory, but it has received little attention in empirical studies.

Is it possible that kids learn when we're not looking? Perhaps we all assume it, but don't take it seriously, or don't take advantage of it.

Summary of Summer Gain. Differences in growth during the summer months were tested for four classrooms representing the extremes of direct and indirect teacher control and of emotional climate. Indirect teacher control in the classroom was found to produce more growth the following summer for Vocabulary. The joint effect of low hostility and indirect teacher control in the classroom produced greater growth in both Arithmetic Concepts and Problems. Patterns of growth for Reading, though non-significant, paralleled the patterns for growth during the previous school year which were found to be significant.

Growth for the summer in comparison to the two academic years was reported and some evidence cited for individual differences in tendency to learn during the summer versus learning during the school year.

Relation of Process Factor Scores to Product Means

This section presents the convergence of all of the process measures and all of the product measures collected in the first year of the study. Earlier sections reported the reduction of the process measures through two successive factor analyses, (Tables 19 and 20), and the calculation of factor scores for the teachers on the basis of the second factor analysis. The other line of development described was the reduction of the pupil product measures to measures of residual true gain for all of the measures administered both at the beginning and end of the year.

Correlation Study of Process Factor Scores With Total Class Product Means. As a way of gaining a broader view of the relations between classroom process and change in pupils, the intercorrelations of the nine process factor scores for each classroom, and the fifteen pupil product measures expressed as means for each classroom, were calculated. The results are presented in Table 35, and discussed below.

Factor 1. Teacher Criticism

No.		Loading
38	Pupil initiation following teacher criticism	-.74
5	Teacher verbal hostility	-.76
24	Steady-state teacher criticism	-.83

This factor correlated negatively with growth in Arithmetic Concepts, Problems, and Total (which is a sum of concepts and problems); and also

Table 35

Correlations[a] of Factor Scores for Classroom Process and Mean Pupil Change[b]

		Iowa Tests of Basic Skills					Children's Manifest Anxiety Scale	
				Arithmetic				
Factor		Vocabulary	Reading	Concepts	Problems	Total	A	L
Teacher Criticism	1	-.160	-.128	-.294*	-.337*	-.362**	-.263*	.078
Teacher vs Pupil Talk	2	-.153	-.151	-.128	-.218	-.185	.058	-.122
Disc. vs Rapid Inter.	3	.288*	.273*	.438**	.091	.242	-.074	-.216
Pupil Freedom in Disc.	4	.097	-.002	.254	-.072	.062	-.186	.001
Unnamed	5	-.022	-.023	-.026	-.077	-.074	-.176	.049
P. Host. vs P. Int.	6	-.299*	-.060	-.290*	-.277*	-.290*	.024	.467**
P. Physical Freedom	7	.148	.043	-.028	-.043	-.085	-.171	.079
Indir. vs Sil. & Conf.	8	.068	.021	.034	.083	.081	.098	-.309*
Unnamed	9	.179	.139	.289*	.202	.245	-.143	.041

[a] N = 55

[b] The Pupil Survey and My Class scores are year-end scores; all others are mean residual true gain scores.

*$p < .05$

**$p < .01$

Table 35 (Continued)

Correlations[a] of Factor Scores for Classroom Process and Mean Pupil Change[b]

Factor		Dependence-Proneness	Minn. Tests of Creativity			Survey	My Class		
			Non-Verbal	Product Imp.	Unusual Uses		Halo	Disorder	Climate
Teacher Criticism	1	.281*	-.108	-.168	-.062	-.056	.204	-.088	-.127
Teacher vs Pupil Talk	2	-.117	.157	.109	-.232	-.192	.017	.149	.119
Disc. vs Rapid Inter.	3	-.197	.198	-.065	.052	.088	-.373**	.144	-.033
Pupil Freedom in Disc.	4	-.005	-.074	-.231	-.208	.026	.251	.036	-.062
Unnamed	5	-.105	-.045	.057	-.236	-.055	.048	.165	-.090
P. Host. vs R. Int.	6	.096	-.211	-.314*	-.198	-.151	-.019	.141	-.035
P. Physical Freedom	7	.098	-.148	-.338*	-.116	.075	-.049	-.055	-.282*
Indir. vs Sil. & Conf.	8	-.162	.328*	.320*	.095	-.117	-.165	.061	.348**
Unnamed	9	-.115	-.128	-.059	.238	.162	.011	-.240	-.038

[a] N = 55

[b] The Pupil Survey and My Class scores are year-end scores; all others are mean residual true gain scores.

*$p < .05$

**$p < .01$

correlated positively with increase in Dependence-Proneness. (Where all signs for a factor were negative, they were treated as positive when summing measures, so that high scores on this factor mean high teacher criticism.) These are the results which would have been expected by pedagogical theory — that a negative classroom should produce less growth in subject matter achievement and greater dependence in children. An additional correlation, barely significant, was that of Teacher Criticism with decrease in Anxiety in the pupils for the school year. Perhaps this was a function of the factor not being completely made up of critical teacher behavior, but including as well the item "Pupil initiation following teacher criticism." This suggests a classroom in which the pupil felt free to answer back following teacher criticism, and it seems reasonable to assume that the classroom so described was not perceived by the pupil as highly stressful, and perhaps also that his response may have resulted in decreased anxiety. Another possibility may be that the decreased anxiety was a consequence of increased dependency -- this interpretation is supported by a correlation of -.41 between these two change measures. This, then, would represent the pupil's buying decreased anxiety at the cost of increased dependency. Perhaps the critical point is that even this degree of negative affect in the classroom hampered learning of arithmetic.

Factor 2. Teacher Talk vs. Extended Pupil Talk.

No.		Loading
18	Ratio of teacher activity to student activity	.83
23	Steady-state lecture	.50
33	Inquiry/drill ratio	-.77
29	Sum of student talk	-.89
32	Inquiry	-.93
28	Student talk prolonged (non-teacher intervening)	-.94

This appears to be a factor in which the dimension involved runs from high proportions of teacher talk in the classroom, to increasing amounts of pupil talk. Although educational theory stresses the importance of pupil participation, the factor did not correlate significantly with any of the pupil product measures.

Factor 3. Extended Discourse vs. Rapid Teacher-Pupil Interchange.

No.		Loading
23	Steady-state lecture	.80
33	Inquiry/drill ratio	.60
31	Drill	-.81
27	Student talk following teacher talk	-.93

This factor seems to represent extended talk in the classroom consisting primarily of teacher lecturing vs. drill. The fact that the Inquiry/drill ratio loads, but Inquiry does not, suggests that a classroom high on this factor is not especially high on Inquiry, but quite low on drill type activities. The build-up of student talk following teacher talk seems to take place primarily in drill sessions; but also, for example, when a child explained an arithmetic problem in response to teacher instructions. Apparently, then, the factor as a whole is one in which teacher activities are central, but they range from teacher primarily lecturing at one pole to drill and other teacher directed activities at the other. This factor correlated positively with growth in Vocabulary, Reading, and Arithmetic Concepts, but negatively with pupil attitude toward the teacher (Halo). So apparently the pupils learned more under the teacher direction at the positive pole of this factor, but they disliked this instructional pattern.

Factor 4. Pupil Freedom in Discussion.

No.		Loading
15	Pupil as Individual	-.52
30	Flexibility	-.54
37	Pupil initiation following teacher direct	-.57
35	Broad Answer	-.64
34	Pupil interrupts	-.86
36	Pupil initiation following teacher indirect	-.89

Since all of the signs were negative, they were ignored in calculating the factor score, so that a high score represents pupil freedom in discussion. There were no significant relationships between this factor and pupil change scores or final measures; however, Arithmetic Concepts and Halo approached significance at the five per cent level. These correlations were in the direction of indicating that pupils grew more in Arithmetic Concepts in classrooms in which there was greater freedom in discussion, and that they had a more favorable attitude toward the classroom, but the possibility that these may be chance occurences cannot be rejected at the five per cent level. Perhaps the surprising finding is that the factor did not relate more clearly with learning.

Factor 5. Unnamed.

No.		Loading
2	Teacher encourages factual answer	-.50
30	Flexibility	-.62
25	Vicious circle	-.84
39	Revised disorder score	-.86

Although the factor was not named, it appeared to be one in which disorder and discipline problems predominated. Perhaps the measure of Flexibility is really one of inconsistency, since it represents the variety of teacher behaviors involved in accounting for 60 per cent of classroom interaction.

There were no significant correlations between this factor and

4

measures of pupil change.

Factor 6. Pupil Hostility vs. Teacher Support and Pupil Interest

No.		Loading
7	Pupil non-verbal hostility	.79
6	Pupil verbal hostility	.66
8	Teacher non-verbal affection	-.56
4	Pupil interest-attention rating	-.65

This factor correlated with more measures of pupil change than any other. A high score indicated high pupil hostility, and a low score, teacher support and pupil interest. The factor correlated negatively with pupil growth in Vocabulary, Arithmetic Concepts, and Problems (and consequently with Total), and with the Product Improvement creativity measure. All of these relationships are in the predicted direction. In addition, there was a positive correlation of .47 with change in the L scale from the Manifest Anxiety Scale.

Although L is a scale which was intended to serve the same purpose as the Lie scale of the MMPI, it is made up of such items as "I am always kind," "I am always good," "I tell the truth every single time," and "I never get angry" (all keyed if answered "true"). It seems reasonable to see this scale as one on which the child is evaluated in terms of the need he feels to describe himself as conforming to adult norms. If this interpretation were accepted, then a classroom with high pupil hostility was associated with greater reported conformity to adult norms.

The higher correlations with achievement for this factor than for Factor 1, Teacher Criticism, suggests the importance of the peer group on the pupil's perception of the emotional climate of the classroom. It is of interest that the climate factor used in the previous analyses of variance combined both teacher and pupil expressions of negative affect, and that may be why it produced significant effects.

Factor 7. Pupil Physical Freedom.

No.		Loading
10	Pupil non-verbal affection	-.70
12	Free movement	-.72
14	Autonomous social groups	-.72
16	Total autonomous groups	-.82

The only measure here which did not involve physical movement or freedom of social interaction on the part of pupils is that of non-verbal affection, and perhaps it is not surprising that where there is more physical and social activity, there might be more expression of non-verbal supportiveness. There were significant negative correlations between this factor and growth in Product Improvement and the climate of the classroom as described by the pupils at the end of the year. The Climate scale includes subscales intended to measure traditional, "lock-step" teaching, and supportiveness, which were combined because of their correlation. Presumably the negative correlation between Climate and this factor is between activity and the restrictive portion of the scale. So apparently high scores on this factor represent classrooms in which there was a great enough degree of physical movement and activity that pupils were aware of its existence, and it was enough that growth in Product Improvement was hampered.

It is perhaps notable that the activity the factor represents is not at all related to subject matter growth. But it may be that these were classrooms in which pupil freedom was generally high, so that greater than average amounts were disruptive of learning rather than facilitative. The negative relation with Product Improvement supports this interpretation.

Factor 8. Indirect Teaching vs. Silence and Confusion.

No.		Loading
20	Extended indirect teacher influence	.77
19	Extended teacher elaboration of student idea	.75
21	Teacher elaboration of student idea	.66
22	Extended questions	.57
26	Silence or confusion	-.54

Although indirect teaching had the highest loading on the factor, teacher elaboration of pupil ideas, one aspect of indirect teaching, also seems quite important. Extended questions suggests complex or broad questions as another element in the factor. The factor correlated positively with two of the creativity measures — Non-Verbal and Product Improvement, and negatively with the L scale. So an indirect classroom, one in which pupil ideas are accepted, supported growth in creativity and also produced a decline in the need pupils felt to describe themselves as conforming to adult norms. The factor also correlated positively with the Climate score and in this case perhaps it was the supportive aspect of the Climate scale which was being reflected in the correlation.

Factor 9. Unnamed.

No.		Loading
9	Pupil verbal affection	.75
3	Teacher encouragement interpretation, generalization, solution	.61
13	Pupil central	.56

This factor was not named. Although all of the measures in it appear to be positive influences, a clear, unifying thread was not apparent. Only one significant correlation was associated with this factor, indicating that high classrooms tended to produce more learning in Arithmetic Concepts.

Summary Discussion of Total Class Results. When growth in subject matter is examined across the various factors, a clear finding is that expression of negative affect in the classroom hindered learning. Teacher criticism (Factor 1) and pupil expression of hostility (Factor 6) both produced numbers of negative correlations with subject matter learning.

Factor 3 (Extended Discourse vs. Rapid Teacher-Pupil Interchange) showed the highest correlation with learning (+.438 for Arithmetic Concepts), and Vocabulary and Reading also correlated positively. Factor 3 had extended teacher talk on the pole which correlated with learning, and drill activities on the opposite pole. It was the strongest of two factors that related positively with subject matter learning. It may be that the pole of this factor which relates to learning reflects primarily teacher direction of the learning process, since steady-state lecture is the heaviest loading measure.

Factor 2 accounts for more variance than any other factor but did not relate at all to pupil learning. It includes teacher activity, student activity and lecture, with extended pupil talk at the other pole.

In contrast, Factor 3 is the only other factor that includes teacher lecture, but it must be a different kind of teacher lecture, and is contrasted with drill activities and short pupil answers. Could this be teacher explanation in short lecture sequence? It is probably not long lecture (as in Factor 2), nor drill (since that is the opposite pole in Factor 3), nor indirect leadership of pupil discussion (since Factor 8 represents that). Perhaps Factor 2 (teacher talk vs. extended pupil talk) failed to relate to learning because it reflected rambling, disorganized discussion in the classroom in contrast to a number of teacher-dominated activities, including lecture. In any case, Factor 2 suggests that the distinction of high teacher activity in contrast to high pupil activity in the classroom is not definitive of classroom learning. In contrast, Factor 3 apparently identifies a portion of the teacher-directed activity that is related to classroom learning.

In the attempt to clarify the question of the nature of the teacher lecture identified by Factor 3, the five highest and lowest teachers on the factor were identified, and the original observer tally sheets for their classrooms were examined. The highest teacher on the factor frequently lectured for intervals as long as two minutes, but the pupils in that classroom showed below average learning. The other four teachers who were high on the factor were similar to each other in showing a frequent pattern in which the teacher lectured at most for fifteen or twenty seconds, asked a question, and the pupils responded. Following pupil response, of varying length, the cycle was repeated. Furst (private communication) suggests the parallel of this apparent optimal cycling to an idea of Bellack's which she modified as her measure of "Optimum Teaching Pace" and applied to Bellack's data for use in one of her composites. By inference, it seems likely that these short intervals of lecture may have been used to pose a problem for pupils to discuss, or to provide limited units of information to which pupils were then required to respond in a way perhaps paralleling the rationale of programmed instruction. As another approach to this question, the average length of lecture for all teachers in the project was calculated and was found to be approximately seven seconds.

What appears to be clearest is that steady-state lecture as identified by Factor 3 was probably numbers of short intervals of lecture rather than continuing long lecture.

The other factor related to learning is Factor 9 in which there was both teacher and pupil activity, but apparently the nature of the activity was such that the teacher encouraged abstract cognitive activities in a supportive climate, and pupils were active as well.

A finding contrary to expectation was that the factor which most clearly described indirect vs. direct teaching (Factor 8) was not related to subject matter learning. This is in contrast to Flanders' (1965) findings, those of Furst (1967), and findings from this project from the analyses of variance results presented earlier. Perhaps a partial explanation may lie in the fact that Revised I/D Ratio for rows 8 and 9 was not weighted heavily enough by this factor analysis to be part of the factor score, whereas it was the sole basis of classification in the analysis of variance presented earlier. It was also one of the measures used by Furst in one of her composites. However, extended indirect teacher influence was the numerator of a ratio used by Furst; and extended teacher elaboration of student idea was one of the measures in Flanders' work which discriminated classes in which achievement was high from classes in which achievement was low.

Another influence which may have made a difference was that the present data reflect relationships across four grade levels, whereas Furst's and Flanders' data were concerned with one grade level, and the analyses of variance reported earlier took out the effect of grade level statistically. One of the findings in the latter study was that there was a significant interaction between grade level and indirect teacher as they affected vocabulary learning.

Still another possibility that seemed worth examining was that the classrooms in this project were in general more indirect, and that this higher over-all level largely eliminated the relationship with achievement. To examine this possibility, the means for a number of IA measures from this project were compared with the same measures taken from pooled matrices for Flanders' (1965) four groups of teachers and from Furst's (1967) data. These two studies were selected because they examined relations between process and product measures. The results are shown in Table 36.

For the I/D Ratio, and the Revised I/D Ratio for rows 8 and 9, the project teachers were more indirect than any of the other groups. For the Extended Indirect and Steady-State 3-3, and Total 3, Acceptance of Pupil Idea, the project teachers fell between Flanders' direct and indirect groups. In addition, they lectured less (Total 5), and in less extended sequences (Steady-State 5-5), used less extended criticism (Steady-State 7-7), and used next-to-least vicious circle behavior.

Part of the differences may be differences between elementary and secondary schools, but over-all, it seems fair to conclude that these teachers were generally as indirect as Flanders' indirect teachers, and as non-critical. It should be noted that the data reported for the project teachers are means for fifty-five teachers — these were all the teachers from the relevant grade levels (less one who was replaced during the year) in the four schools in the project. The Flanders data, on the other hand, are teachers who were selected from a larger number to represent the extremes of directness and indirectness. Accordingly, the

Table 36

Comparison of Three Studies on Selected Measures of Flanders' Interaction Analysis

Measure	Project Sample	Flanders' Study				Bellack Furst Study
		Mathematics		Social Studies		
		Ind.	Dir.	Ind.	Dir.	
R I D 8 + 9	8.82	7.65	0.93	8.31	1.25	1.91
R I D	3.19	2.32	0.28	1.61	0.27	1.03
I/D	1.51	0.41	0.25	0.47	0.37	0.28
Steady State 3-3	0.62	2.93	0.53	2.53	0.41	0.94
Extended Indirect	2.48	3.66	0.78	3.05	0.62	2.02
Total 3	7.66	8.11	2.63	8.28	3.03	4.24
Total 5	20.14	46.72	40.83	37.45	25.67	45.85
Steady State 5-5	11.33	38.39	31.29	31.06	17.04	38.03
Steady State 7-7	0.08	0.25	1.88	0.68	2.41	0.75
Vicious Circle	1.74	1.31	5.39	2.55	7.02	2.03

lesser variability in this project may have lowered the relationships.

Another possibility may be that more indirect teaching produces greater learning only up to some optimal level and not beyond it. Solomon, Bezdek and Rosenberg (1963) found that an intermediate level of "Permissiveness" produced a higher level of achievement gain in college-level teaching than did either extreme. The shape of this relationship appears to be a question worthy of further study.

Growth in creativity, another area of interest, was fostered by indirect teaching in which the teacher supported the development of pupil ideas (Factor 8), but Product Improvement was hindered by the high physical movement which was identified by Factor 7, and by the expression of negative pupil affect identified by Factor 6.

In the area of pupil personality, teacher hostility in the classroom produced increased dependency but decreased anxiety (Factor 1). Again, the factor reflected teacher criticism which was not so extreme but that pupils responded to it. It was noted that change in anxiety correlated -.41 with the change in dependency, indicating that as the pupil became more dependent he also became less anxious. Perhaps what is represented here is an externalizing vs. internalizing of control on the part of the pupil. In addition, pupil hostility in the classroom (Factor 6) was associated with greater tendencies for pupils to describe themselves as conforming (L), while indirect teaching (Factor 8) produced a decrease in the same tendency.

Finally, the attitude of the pupil toward the classroom at the end of the year was associated with three of the factors -- pupils disliked (Halo) the teacher direction (Factor 3) which produced the most subject-matter learning; and, apparently, a description of the classroom as non-traditional was associated with considerable pupil physical freedom (Factor 7), and also a perception of the supportiveness of the classroom was associated with indirect teaching (Factor 8).

All in all, there is support for educational theory running through much of these results, but the support is not great for relatively simple interpretations. Rather, different kinds of classroom behavior seem to produce some kinds of growth, but not others. It is important to note, however, that with only two exceptions there are no classroom behaviors which promote one kind of learning at the sacrifice of another. They seem to be compatible.

These results suggest that teaching is so complex that no single aspect supports the achievement of a wide variety of educational goals -- rather than a single key to effective teaching, we seem to need many. Perhaps what is indicated, at least at these grade levels, is a complex pattern of teaching made up, first of all, of avoidance of hostility and criticism, but with teacher direction of learning by brief explanation rather than extended lecture, and moderately indirect teaching with clear structure.

Correlation Analysis of Process Factor Scores with Subgroup Means

One of the questions which was examined in the project was the question of whether or not groups of pupils differing in sex, anxiety level, dependency, or L scale score would differ in their sensitivity to the effects of classroom process.

This question was examined by dividing the total pupil group at the median for L, A, and D-P score, and then sorting them into classroom groups. In similar fashion, the boys and girls were separated. Product means were calculated for each classroom for each subgroup, and these subgroup means were correlated with the process factor scores which described the classrooms. It should be remembered that the product measures being correlated were residual true gain scores, so that what was represented was not status of the pupils at any given point, but change during the year.

Since the means and standard deviations of these subgroups were not of particular interest, they will be found in Appendix A. Each mean contains a constant of 50, which was added to each score in calculating residual gain to eliminate negative values. Since the standard deviation for each of these distributions is the standard deviation of a kind of empirical sampling distribution of means, it can be taken as a kind of "rough and ready" standard error of the mean. Since the numbers of cases varied from classroom to classroom in the individual subgroups, no very precise use can be made of this statistic, but even using it in a very rough way, it is clear that no differences of any consequence occurred between the subgroups on any of the measures.

When the intercorrelation tables for the various subgroups were examined, no significance tests were calculated, since the numbers of them which would be involved would have made their interpretation doubtful at best; rather, the matrices were inspected, trends sought, and only relatively large differences noted.

Differences in Correlations Between the Sexes. When the patterns of the correlations were examined for differences in the relations between the process factor scores and the measures of pupil change for the total class means (Table 35), and for the boys and girls separately (Tables 37 and 38), the only differences which were observed seemed to be ones which could have occurred by chance in a sample of this size (fifty-five). In the light of the McGuire, Hindsman, King and Jennings (1961) finding of different relations between anxiety and achievement for the sexes, it had been anticipated that girls, who are usually more anxious, would respond differently to the classroom process factors, especially those involving affect.

Differences in Correlations for Subgroups Differing in Anxiety Level. The intercorrelations for the low anxious group are in Table 39, and for the high anxious group in Table 40. For Factor 1, the patterns for the two subgroups appeared to follow those of the total group. For Factor 2, Teacher Talk vs. Extended Pupil Talk, two significant negative correlations with achievement appeared for the high anxious group, whereas there were none significant for the total group. These were for Arithmetic Problems and Arithmetic Total. This follows the expectation that high anxious pupils would be more affected by classroom conditions than low anxious pupils. For Factor 3, Extended Discourse vs. Rapid Teacher Pupil Interchange, again, correlations with the achievement measures appear to be somewhat higher for the high anxious than for the low anxious, although this is not a consistent trend. The largest difference appeared for Arithmetic Concepts for which there was a correlation of .51 with the factor.

Factors 4 through 7 showed no differences between the two groups. For Factor 8, Indirect Teaching vs. Silence and Confusion, the

Table 37

Correlations Between Classroom Process Factor Scores and Classroom Means for Girls for the First Project Year*

		Iowa Tests of Basic Skills							
				Arithmetic			CMAS		
		Vocab. 10	Read. 11	Con. 12	Prob. 13	Tot. 14	A 15	L 16	D-P 17
Process Factor Scores									
Teacher Criticism	1	-.044	-.081	-.230	-.223	-.254	-.220	-.025	.283
Teacher vs P. Talk	2	-.150	-.139	-.120	-.213	-.189	.020	-.059	-.029
Disc. vs Rapid Inter	3	.267	.131	.380	.050	.206	-.156	-.209	-.067
P. Freedom in Disc.	4	.076	-.016	.290	-.093	.076	-.245	.086	-.165
Unnamed	5	.000	-.170	-.056	-.107	-.106	-.139	.049	-.072
P. Host. vs P. Int.	6	-.290	.012	-.264	-.295	-.301	.024	.472	-.047
P. Physical Freedom	7	.103	.035	-.067	-.106	-.159	-.201	.168	.060
Indir. vs. Sil.& Conf.	8	.030	.064	.020	.101	.083	.167	-.306	.043
Unnamed	9	.099	.144	.299	.085	.201	-.025	.066	-.218
Iowa Tests of Basic Skills									
Vocabulary	10	--	.309	.481	.353	.445	-.221	-.383	.182
Reading	11		--	.355	.451	.476	-.257	-.016	.305
Arith. Concepts	12			--	.429	.815	-.074	-.236	-.219
Arith. Problems	13				--	.827	-.253	-.240	.164
Arith. Total	14					--	-.130	-.223	-.023
Children's Manifest Anxiety Scale									
Anxiety	15						--	.133	-.352
L	16							--	-.219
Dependence-Proneness	17								--

*N = 55 $p < .05 = .26$ $p < .01 = .34$

Table 37 (Continued)

Correlations Between Classroom Process Factor Scores and Classroom Means for Girls for the First Project Year*

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Process Factor Scores										
Teacher Criticism	1	-.098	-.152	-.109	-.027	-.036	-.158	.174	-.047	.017
Teacher vs P. Talk	2	.118	.108	-.176	-.072	-.011	-.121	.110	.150	.192
Disc. vs Rapid Inter.	3	.277	-.016	.081	.068	-.011	.020	-.311	.147	-.075
P. Freedom in Disc.	4	.035	-.113	-.048	-.090	-.106	.019	.305	.050	-.034
Unnamed	5	-.025	.087	-.230	-.186	-.063	-.049	.040	.122	.004
P. Host. vs P. Int.	6	-.145	-.289	-.105	.127	-.076	-.312	-.048	.258	.109
P. Physical Freedom	7	-.057	-.284	-.024	-.120	-.094	.023	.009	.035	-.119
Indir. vs. Sil. & Conf.	8	.244	.323	.017	-.071	.063	-.080	-.112	.073	.211
Unnamed	9	-.120	-.111	.161	.021	.043	.053	-.103	-.194	-.107
Iowa Tests of Basic Skills										
Vocabulary	10	.082	-.107	.188	-.046	-.054	.401	.029	-.100	-.109
Reading	11	-.076	-.275	.152	-.034	-.048	.028	-.016	-.262	-.112
Arith. Concepts	12	.116	-.229	.325	-.037	.015	.157	-.113	-.017	-.031
Arith. Problems	13	-.077	-.020	.352	-.238	-.051	.018	.078	-.180	-.049
Airth. Total	14	.023	-.190	.342	-.159	-.075	.059	-.019	-.096	-.078
Children's Manifest Anxiety Scale										
Anxiety	15	.197	.267	.057	-.081	.177	.021	-.143	.322	.290
L	16	-.323	-.321	-.070	.002	-.112	-.010	.017	.091	.011
Dependence-Proneness	17	.058	.075	-.060	-.003	-.065	.137	.250	-.419	-.060

Table 37 (Continued)

Correlations Between Classroom Process Factor Scores and Classroom Means for Girls for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Minnesota Tests of Creativity										
Non-Verbal	18	--	.344	.049	.038	.190	.201	.030	.308	.205
Product Improve.	19		--	-.001	.023	.230	.173	.030	.120	.212
Unusual Uses	20			--	.042	.190	.030	-.265	-.176	.103
Russell Sage Social Relations Test										
Activity	21				--	.364	-.002	-.200	.100	-.023
Total	22					--	-.092	-.096	.299	.128
Pupil Survey	23						--	.097	-.138	-.174
My Class										
Halo	24							--	-.265	-.015
Disorder	25								--	.299
Climate	26									--

Table 38

Correlations Between Classroom Process Factor Scores and Classroom Means for Boys for the First Project Year*

		Iowa Tests of Basic Skills							
				Arithmetic			CMAS		
		Vocab. 10	Read. 11	Con. 12	Prob. 13	Tot. 14	A 15	L 16	D-P 17
Process Factor Scores									
Teacher Criticism	1	-.205	-.152	-.324	-.383	-.409	-.171	.156	.234
Teacher vs P. Talk	2	-.099	-.109	-.122	-.196	-.156	.054	-.178	-.119
Disc. vs Rapid Inter	3	.215	.388	.433	.101	.238	.019	-.167	-.212
P. Freedom in Disc.	4	.046	.043	.178	-.065	.027	-.042	-.051	.089
Unnamed	5	-.049	.115	.030	-.056	-.030	-.139	.031	-.060
P. Host. vs P. Int.	6	-.285	-.126	-.269	-.246	-.252	.019	.372	.159
P. Physical Freedom	7	.135	.042	.021	-.008	-.025	-.075	-.026	.108
Indir. vs. Sil.& Conf.	8	.139	-.015	.045	.055	.070	-.010	-.278	-.282
Unnamed	9	.173	.036	.218	.294	.252	-.192	.031	-.031
Iowa Tests of Basic Skills									
Vocabulary	10	--	.402	.537	.436	.515	-.152	-.364	-.130
Reading	11		--	.428	.655	.613	-.261	-.134	.101
Arith. Concepts	12			--	.449	.783	-.046	-.280	-.351
Arith. Problems	13				--	.860	-.174	-.054	.071
Arith. Total	14					--	-.104	-.112	-.093
Children's Manifest Anxiety Scale									
Anxiety	15						--	-.093	-.326
L	16							--	.239
Dependence-Proneness	17								--

*N = 55 P < .05 = .26 P < .01 = .34

Table 38 (Continued)

Correlations Between Classroom Process Factor Scores and
Classroom Means for Boys for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Process Factor Scores										
Teacher Criticism	1	-.107	-.157	-.029			.056	.211	-.138	-.207
Teacher vs P. Talk	2	.147	.107	-.237			-.246	-.090	.134	.028
Disc. vs Rapid Inter.	3	.082	-.124	.014			.120	-.376	.142	.065
P. Freedom in Disc.	4	-.159	-.306	-.293			-.028	.110	.058	-.057
Unnamed	5	-.031	.047	-.202			-.055	.059	.181	-.153
P. Host. vs P. Int.	6	-.232	-.278	-.211			-.011	.022	-.025	-.120
P. Physical Freedom	7	-.169	-.330	-.141			.096	-.104	-.145	-.364
Indir. vs. Sil. & Conf.	8	.321	.266	.117			-.088	-.204	.064	.361
Unnamed	9	-.057	.019	.308			.208	.135	-.240	.033
Iowa Tests of Basic Skills										
Vocabulary	10	-.103	-.043	.259			.520	-.076	-.005	.068
Reading	11	.044	-.100	.100			.352	.004	-.220	.099
Arith. Concepts	12	-.073	-.197	.113			.233	-.288	.024	.056
Arith. Problems	13	-.034	-.120	.197			.287	.048	-.224	-.055
Airth. Total	14	-.068	-.168	.086			.277	-.107	-.112	-.003
Children's Manifest Anxiety Scale										
Anxiety	15	.142	-.058	-.147			-.165	-.154	.439	.073
L	16	-.103	-.072	.006			-.026	.033	-.072	.012
Dependence-Proneness	17	-.062	.185	-.049			.119	.526	-.482	-.081

Table 38 (Continued)

Correlations Between Classroom Process Factor Scores and Classroom Means for Boys for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Minnesota Tests of Creativity										
Non-Verbal	18	--	.510	.091			.080	.021	.055	.124
Product Improve.	19		--	.136			.100	.205	-.010	.167
Unusual Uses	20			--			.285	.006	-.345	.255
Russell Sage Social Relations Test										
Activity	21									
Total	22									
Pupil Survey	23						--	.125	-.125	.101
My Class										
Halo	24							--	-.426	-.271
Disorder	25								--	.056
Climate	26									--

Table 39

Correlations Between Classroom Process Factor Scores and Classroom Means for Low Anxious Group for the First Project Year*

		Iowa Tests of Basic Skills							
				Arithmetic			CMAS		
		Vocab. 10	Read. 11	Con. 12	Prob. 13	Tot. 14	A 15	L 16	D-P 17
Process Factor Scores									
Teacher Criticism	1	-.219	-.028	-.340	-.319	-.384	-.254	.145	.278
Teacher vs P. Talk	2	-.124	-.046	-.038	-.119	-.054	.057	-.110	-.111
Disc. vs Rapid Inter	3	.218	.271	.306	.156	.203	-.131	-.220	.000
P. Freedom in Disc.	4	.037	.046	.225	-.059	.035	-.183	-.041	.032
Unnamed	5	-.123	-.039	-.056	-.011	-.049	-.138	.061	-.117
P. Host. vs P. Int.	6	-.318	-.017	-.284	-.226	-.269	-.035	.462	.158
P. Physical Freedom	7	.087	.061	.027	.014	.004	-.108	.071	.174
Indir. vs. Sil.& Conf.	8	.080	.040	.075	.115	.108	.050	-.277	-.048
Unnamed	9	.177	.147	.325	.159	.248	-.183	-.008	-.148
Iowa Tests of Basic Skills									
Vocabulary	10	--	.351	.421	.334	.389	-.162	-.447	.151
Reading	11		--	.456	.563	.572	-.288	-.139	.385
Arith. Concepts	12			--	.504	.830	-.055	-.376	-.266
Arith. Problems	13				--	.852	-.135	-.335	.080
Arith. Total	14					--	-.103	-.330	-.097
Children's Manifest Anxiety Scale									
Anxiety	15						--	.026	-.308
L	16							--	.164
Dependence-Proneness	17								--

*N = 55 $p < .05 = .26$ $p < .01 = .34$

Table 39 (Continued)

Correlations Between Classroom Process Factor Scores and Classroom Means for Low Anxious Group for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Process Factor Scores										
Teacher Criticism	1	-.113	-.198	-.046	-.027	-.036	.031	.252	-.051	-.004
Teacher vs P. Talk	2	.130	.209	-.296	-.072	-.011	-.165	-.026	.107	.111
Disc. vs Rapid Inter.	3	.265	-.060	.107	.068	-.011	.029	-.297	.050	-.011
P. Freedom in Disc.	4	-.013	-.211	-.212	-.090	-.106	.034	.329	.069	-.051
Unnamed	5	-.033	.083	-.137	-.186	-.063	.229	.108	.227	.052
P. Host. vs P. Int.	6	-.172	-.280	-.203	.127	-.076	-.050	.025	.182	.025
P. Physical Freedom	7	-.038	-.243	-.177	-.120	-.094	-.020	-.038	-.070	-.195
Indir. vs. Sil. & Conf.	8	.322	.412	.027	-.071	.063	-.156	-.183	-.040	.263
Unnamed	9	-.058	-.058	.206	.021	.043	.195	.081	-.256	-.024
Iowa Tests of Basic Skills										
Vocabulary	10	.144	.053	.187	.015	-.006	.120	-.028	-.161	-.087
Reading	11	.075	-.179	.159	-.039	-.034	.088	.138	-.302	.035
Arith. Concepts	12	.036	-.302	.249	-.135	-.051	-.076	-.175	-.081	-.048
Arith. Problems	13	.178	-.127	.196	-.193	-.063	-.007	.011	-.170	-.125
Airth. Total	14	.064	-.284	.165	-.188	-.135	-.093	-.130	-.125	-.146
Children's Manifest Anxiety Scale										
Anxiety	15	.311	.184	.139	-.051	.236	-.279	-.028	.298	.172
L	16	-.339	-.180	-.040	.102	-.229	.249	-.007	.114	.054
Dependence-Proneness	17	.110	.113	-.113	.079	-.162	.221	.366	-.416	-.068

Table 39 (Continued)

Correlations Between Classroom Process Factor Scores and Classroom Means for Low Anxious Group for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Minnesota Tests of Creativity										
Non-Verbal	18	--	.395	.096	-.021	.151	.088	.048	.041	.152
Product Improve.	19		--	.060	-.063	.099	.242	.073	.048	.195
Unusual Uses	20			--	.095	.067	.082	-.123	-.252	.141
Russell Sage Social Relations Test										
Activity	21				--	.364	-.035	-.180	.094	-.064
Total	22					--	-.201	-.147	.301	.037
Pupil Survey	23						--	.126	-.087.	-.102
My Class										
Halo	24							--	-.409	-.084
Disorder	25								--	.139
Climate	26									--

Table 40

Correlations Between Classroom Process Factor Scores and Classroom Means for High Anxious Group for the First Project Year*

		Iowa Tests of Basic Skills							
				Arithmetic			CMAS		
		Vocab. 10	Read. 11	Con. 12	Prob. 13	Tot. 14	A 15	L 16	D-P 17
Process Factor Scores									
Teacher Criticism	1	-.148	-.100	-.214	-.266	-.277	-.158	-.006	.297
Teacher vs P. Talk	2	-.151	-.259	-.210	-.301	-.302	.038	-.055	-.056
Disc. vs Rapid Inter	3	.280	.241	.511	.091	.280	-.027	-.141	-.258
P. Freedom in Disc.	4	.065	-.067	.244	-.082	.056	-.064	.058	.041
Unnamed	5	.041	-.007	.001	-.122	-.091	-.165	.081	-.047
P. Host. vs P. Int.	6	-.263	-.062	-.266	-.311	-.307	.062	.365	.098
P. Physical Freedom	7	.133	.055	-.036	-.036	-.097	-.171	.082	.052
Indir. vs. Sil.& Conf.	8	.048	-.005	-.045	.051	.026	.082	-.272	-.241
Unnamed	9	.164	.084	.208	.230	.209	-.036	.083	-.064
Iowa Tests of Basic Skills									
Vocabulary	10	--	.508	.532	.458	.553	-.163	-.285	-.171
Reading	11		--	.397	.649	.604	-.216	-.118	-.037
Arith. Concepts	12			--	.448	.776	-.035	-.108	-.201
Arith. Problems	13				--	.863	-.296	-.081	.057
Arith. Total	14					--	-.152	-.046	-.013
Children's Manifest Anxiety Scale									
Anxiety	15						--	.012	-.198
L	16							--	-.029
Dependence-Proneness	17								--

*N = 55   p <.05 = .26   p <.01 = .34

Table 40 (Continued)

Correlations Between Classroom Process Factor Scores and
Classroom Means for High Anxious Group for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Process Factor Scores										
Teacher Criticism	1	-.035	-.100	-.085	-.027	-.036	-.225	.164	-.004	.010
Teacher vs P. Talk	2	.142	-.044	-.133	-.072	-.011	-.163	.132	.149	.134
Disc. vs Rapid Inter.	3	.120	-.056	.005	.068	-.011	.050	-.344	.103	-.019
P. Freedom in Disc.	4	-.087	-.216	-.174	-.090	-.106	.006	.169	.049	.051
Unnamed	5	-.054	.028	-.318	-.186	-.063	-.238	.054	.162	.043
P. Host. vs P. Int.	6	-.189	-.259	-.167	.127	-.076	-.259	-.059	-.033	-.095
P. Physical Freedom	7	-.191	-.334	-.083	-.120	-.094	.015	-.131	-.137	-.196
Indir. vs. Sil. & Conf.	8	.286	.180	.170	-.071	.063	-.071	-.082	.078	.131
Unnamed	9	-.220	-.079	.241	.021	.043	.190	-.044	-.099	-.047
Iowa Tests of Basic Skills										
Vocabulary	10	-.142	-.200	.303	-.307	-.073	.456	-.093	.047	.032
Reading	11	.063	-.107	.163	-.200	-.059	.175	-.165	-.271	-.192
Arith. Concepts	12	-.052	-.237	.186	-.135	-.005	.315	-.171	.001	.021
Arith. Problems	13	-.227	.012	.311	-.256	-.096	.308	-.093	-.221	-.091
Airth. Total	14	-.132	-.095	.229	-.248	-.132	.360	-.122	-.131	-.024
Children's Manifest Anxiety Scale										
Anxiety	15	.343	.192	-.147	.014	.351	-.014	-.067	.170	.144
L	16	-.160	-.141	-.167	-.012	-.100	-.042	-.021	-.012	.045
Dependence-Proneness	17	-.091	.188	-.038	-.012	-.204	.017	.271	-.417	-.183

Table 40 (Continued)

Correlations Between Classroom Process Factor Scores and
Classroom Means for High Anxious Group for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Minnesota Tests of Creativity										
Non-Verbal	18	--	.435	-.116	.169	.287	.025	-.135	-.010	-.080
Product Improve.	19		--	.081	.107	.222	.010	-.005	-.014	-.014
Unusual Uses	20			--	.062	.159	.084	-.088	-.179	.037
Russell Sage Social Relations Test										
Activity	21				--	.364	.015	-.247	.006	-.135
Total	22					--	.168	-.267	-.041	-.202
Pupil Survey	23						--	-.084	-.184	-.217
My Class										
Halo	24							--	.374	.529
Disorder	25								--	.840
Climate	26									--

patterns appeared similar except for a possible difference for the Product Improvement measure. Whereas this correlation was .32 for the total group, it rose to .41 for the low anxious group, but dropped to .18 for the high anxious. This would seem a reasonable finding, in the sense that high anxious pupils might be expected to feel the need for more structure in their environment, and within a sample of classrooms which were already quite indirect, might reasonably feel more anxiety in the more indirect classrooms.

Factor 9, which was unnamed, appeared quite similar for the two subgroups and the total groups.

Differences in Correlations for Subgroups Differing in L. For the first two factors of the analysis the patterns appeared to be similar, as shown in Tables 41 and 42. For Factor 3, Extended Discourse vs. Rapid Teacher Pupil Interchange, the correlations for Vocabulary and Reading which were significant for the total group, and for the low L subgroup, became essentially zero for the high L subgroup. This may be a reasonable result, if it is hypothesized that extended discourse is, for most pupils, a more effective classroom process for learning than drill, but that the high L group is essentially a highly conforming group for whom drill may be somewhat more effective than for other pupils. Apparently, the advantage of discourse ceases to exist for the high L group. A significant correlation still existed for Concepts for all three groups, but perhaps Concepts cannot be drilled.

For Factors 4 through 8, the differences between the two subgroups seem minor. Factor 9, however, which was made up of Pupil Verbal Affection; Teacher Encourages Interpretation, Generalization, Solution;

Table 41

Correlations Between Classroom Process Factor Scores and Classroom Means for Low L Group for the First Project Year*

		Iowa Tests of Basic Skills							
				Arithmetic			CMAS		
		Vocab. 10	Read. 11	Con. 12	Prob. 13	Tot. 14	A 15	L 16	D-P 17
Process Factor Scores									
Teacher Criticism	1	-.206	-.112	-.313	-.366	-.405	-.265	.051	.225
Teacher vs P. Talk	2	-.197	-.215	-.058	-.139	-.114	-.026	-.062	-.047
Disc. vs Rapid Inter	3	.295	.326	.376	.029	.187	.057	-.250	-.177
P. Freedom in Disc.	4	.081	.067	.152	-.161	-.055	-.140	-.081	.025
Unnamed	5	.075	.004	.019	-.100	-.085	-.212	.064	-.132
P. Host. vs P. Int.	6	-.348	.046	-.193	-.323	-.312	-.076	.359	.182
P. Physical Freedom	7	.125	.011	-.031	-.067	-.128	-.086	.079	.189
Indir. vs. Sil.& Conf.	8	-.082	-.040	.000	.196	.146	.063	-.153	-.078
Unnamed	9	.050	.067	.316	.114	.201	-.089	.000	-.019
Iowa Tests of Basic Skills									
Vocabulary	10	--	.383	.381	.432	.451	-.096	-.531	.019
Reading	11		--	.344	.608	.569	-.146	.052	.292
Arith. Concepts	12			--	.309	.715	.034	-.091	-.144
Arith. Problems	13				--	.837	-.102	-.148	.256
Arith. Total	14					--	-.043	-.066	.113
Children's Manifest Anxiety Scale									
Anxiety	15						--	-.025	-.245
L	16							--	.108
Dependence-Proneness	17								--

*N = 54 $p < .05 = .26$ $p < .01 = .34$

Table 41 (Continued)

Correlations Between Classroom Process Factor Scores and Classroom Means for Low L Group for the First Project Year

		Minnesota Tests of Creativity			RSSR			My Class		
Measure		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Activity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Process Factor Scores										
Teacher Criticism	1	.021	-.034	-.067	-.021	-.058	-.092	.233	-.053	-.175
Teacher vs P. Talk	2	.242	.224	-.254	-.071	-.015	-.207	.016	.121	.243
Disc. vs Rapid Inter.	3	.070	-.074	-.084	.080	-.044	.044	-.350	.104	-.037
P. Freedom in Disc.	4	.051	-.195	-.187	-.088	-.112	-.036	.218	-.044	-.062
Unnamed	5	.122	.100	-.188	-.196	-.039	.129	.130	.227	.065
P. Host. vs P. Int.	6	.016	-.125	-.186	.133	-.094	-.069	-.034	.188	-.162
P. Physical Freedom	7	-.191	-.291	-.171	-.114	-.121	.074	-.244	-.041	-.427
Indir. vs. Sil. & Conf.	8	.138	.174	.062	-.065	.041	-.185	-.068	-.049	.437
Unnamed	9	-.148	-.087	.265	.012	.074	.321	.041	-.236	.099
Iowa Tests of Basic Skills										
Vocabulary	10	-.119	-.221	.127	-.118	-.143	.219	-.233	-.072	-.161
Reading	11	-.022	-.190	.078	-.161	-.108	.225	-.065	-.196	-.003
Arith. Concepts	12	-.206	-.167	.187	-.013	.087	.230	-.233	-.157	-.029
Arith. Problems	13	-.260	-.270	.169	-.206	-.117	.111	-.112	-.237	.010
Airth. Total	14	-.270	-.284	.123	-.140	-.096	.133	-.201	-.231	-.017
Children's Manifest Anxiety Scale										
Anxiety	15	.280	.226	.154	.009	.447	-.053	-.258	.355	-.003
L	16	-.068	-.067	-.151	.037	.028	.012	.030	.031	.032
Dependence-Proneness	17	-.114	-.056	-.083	-.022	-.124	.194	.304	-.426	-.177

Table 41 (Continued)

Correlations Between Classroom Process Factor Sccres and Classroom Means for Low L Group for the First Project Year

Measure		Minnesota Tests of Creativity Non-Verbal 18	Minnesota Tests of Creativity Prod. Impr. 19	Minnesota Tests of Creativity Unus. Uses 20	RSSR Acti-vity 21	RSSR Tot. 22	Pupil Surv. 23	My Class Halo 24	My Class Disor. 25	My Class Clim. 26
Minnesota Tests of Creativity										
Non-Verbal	18	--	.512	-.148	.232	.312	-.004	.119	.380	.146
Product Improve.	19		--	-.062	.151	.454	.068	.211	.252	.106
Unusual Uses	20			--	.107	.153	.088	-.214	-.309	.168
Russell Sage Social Relations Test										
Activity	21				--	.380	-.055	-.085	.162	-.070
Total	22					--	.033	-.110	.348	.007
Pupil Survey	23						--	-.073	.011.	-.117
My Class										
Halo	24							--	-.301	-.094
Disorder	25								--	.129
Climate	26									--

Table 42

Correlations Between Classroom Process Factor Scores and
Classroom Means for High L Group for the First Project Year*

		Iowa Tests of Basic Skills							
				Arithmetic			CMAS		
		Vocab. 10	Read. 11	Con. 12	Prob. 13	Tot. 14	A 15	L 16	D-P 17
Process Factor Scores									
Teacher Criticism	1	-.146	-.158	-.256	-.264	-.285	-.224	.083	.323
Teacher vs P. Talk	2	-.083	-.110	-.164	-.282	-.221	.075	-.170	-.231
Disc. vs Rapid Inter	3	.047	.105	.346	.118	.193	-.163	-.151	-.066
P. Freedom in Disc.	4	.096	.007	.304	.043	.159	-.212	.032	-.007
Unnamed	5	-.065	-.005	-.060	-.036	-.054	-.121	-.024	-.049
P. Host. vs P. Int.	6	-.215	-.089	-.304	-.207	-.241	.003	.464	.058
P. Physical Freedom	7	.080	.082	-.013	.038	-.003	-.225	.102	.045
Indir. vs. Sil.& Conf.	8	.227	.000	-.039	-.062	-.047	.132	-.348	-.248
Unnamed	9	.368	.264	.273	.229	.244	-.173	.065	-.222
Iowa Tests of Basic Skills									
Vocabulary	10	--	.384	.387	.409	.398	-.286	-.132	-.046
Reading	11		--	.374	.603	.553	-.324	-.069	.211
Arith. Concepts	12			--	.546	.820	-.161	-.223	-.159
Arith. Problems	13				--	.882	-.321	-.103	.127
Arith. Total	14					--	-.247	-.131	.042
Children's Manifest Anxiety Scale									
Anxiety	15						--	.025	-.429
L	16							--	.100
Dependence-Proneness	17								--

*N = 55 $p < .05 = .26$ $p < .01 = .34$

Table 42 (Continued)

Correlations Between Classroom Process Factor Scores and Classroom Means for High L Group for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Process Factor Scores										
Teacher Criticism	1	-.156	-.164	-.099	-.027	-.036	-.073	.124	-.120	-.113
Teacher vs P. Talk	2	.044	.065	-.220	-.072	-.011	-.145	-.019	.154	.023
Disc. vs Rapid Inter.	3	.224	-.034	.092	.068	-.011	.146	-.299	.109	.098
P. Freedom in Disc.	4	-.109	-.200	-.155	-.090	-.106	.039	.227	.071	-.119
Unnamed	5	-.088	.063	-.246	-.186	-.063	-.141	.025	.141	-.097
P. Host. vs P. Int.	6	-.269	-.328	-.168	.127	-.076	-.238	-.006	.104	-.008
P. Physical Freedom	7	-.150	-.328	-.078	-.120	-.094	.034	.001	-.073	-.187
Indir. vs. Sil. & Conf.	8	.251	.261	.013	-.071	.063	-.097	-.245	.115	.210
Unnamed	9	-.030	.003	.265	.021	.043	.091	.053	-.250	-.122
Iowa Tests of Basic Skills										
Vocabulary	10	-.078	-.036	.363	-.132	.008	.374	-.012	-.192	-.085
Reading	11	-.013	-.236	.254	-.085	-.079	.057	.102	-.460	-.182
Arith. Concepts	12	.139	-.229	.210	-.199	-.096	.282	-.059	-.048	-.087
Arith. Problems	13	-.027	-.052	.361	-.277	-.176	.306	.092	-.292	-.134
Airth. Total	14	.052	-.165	.252	-.296	-.239	.308	.043	-.192	-.144
Children's Manifest Anxiety Scale										
Anxiety	15	.268	.187	-.086	-.008	.267	-.199	-.066	.385	.347
L	16	-.337	-.308	-.139	.052	-.266	-.048	-.052	-.035	-.050
Dependence-Proneness	17	-.072	.068	-.032	.068	-.236	.180	.235	-.476	-.224

Table 42 (Continued)

Correlations Between Classroom Process Factor Scores and Classroom Means for High L Group for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Minnesota Tests of Creativity										
Non-Verbal	18	--	.422	.094	.038	.184	.156	.035	.108	.161
Product Improve.	19		--	.155	-.051	.063	.181	.168	-.035	.273
Unusual Uses	20			--	.079	.065	.193	.018	-.355	.058
Russell Sage Social Relations Test										
Activity	21				--	.364	-.026	-.206	.179	.002
Total	22					--	-.015	-.163	.323	.048
Pupil Survey	23						--	.186	-.172	-.017
My Class										
Halo	24							--	-.392	-.207
Disorder	25								--	.191
Climate	26									--

and Pupil Central, but for which no central theme was identified, showed some correlations different enough to warrant comment. Vocabulary and Reading were significant for the high L group, whereas the correlations were zero for the low L group. For both groups, as well as for the total class, Concepts correlated positively and significantly. Perhaps it would be reasonable to assume that for a highly conforming group of pupils, the supportive elements of Factor 9 might have more effect in the learning of vocabulary, and reading, than for low conforming pupils, but it is not clear why the effect failed to generalize the other measures.

Differences in Correlation for Subgroups Differing in Dependence-Proneness. The results for the first three factors appear relatively similar for these two subgroups, as shown in Tables 43 and 44. For Factor 4, Pupil Freedom in Discussion, the results appear to be different for the Product Improvement measure. Whereas the correlation of -.23 was not significant for the total group, it dropped to -.04 for the high dependence-prone subgroup, and rose to -.37 for the low dependence subgroup. It is not clear why a low dependent subgroup should be hampered in creativity growth by freedom in discussion, however.

For Factor 6, Pupil Hostility vs. Pupil Interest, the negative correlations with Vocabulary and the Arithmetic measures were in the low thirties for the low dependent group, but low for the high dependent group. It seems curious that the low dependent group should be more hampered by negative classroom process than the high dependent group.

For Factor 7, Pupil Physical Freedom, the correlation for Non-Verbal Creativity may be different between the subgroups. Whereas it was essentially zero in the high dependent group, in the low dependent

Table 43

Correlations Between Classroom Process Factor Scores and Classroom Means for Low Dependence-Prone Group for the First Project Year*

		Iowa Tests of Basic Skills							
				Arithmetic			CMAS		
		Vocab. 10	Read. 11	Con. 12	Prob. 13	Tot. 14	A 15	L 16	D-P 17
Process Factor Scores									
Teacher Criticism	1	-.164	-.165	-.223	-.313	-.329	-.149	.036	.220
Teacher vs P. Talk	2	-.149	-.109	-.147	-.256	-.215	.137	-.003	-.067
Disc. vs Rapid Inter	3	.186	.316	.391	.067	.205	-.142	-.163	-.141
P. Freedom in Disc.	4	.068	.008	.156	-.068	-.004	-.091	-.010	-.074
Unnamed	5	-.028	.093	-.011	-.157	-.123	-.063	.168	-.133
P. Host. vs P. Int.	6	-.335	-.166	-.304	-.366	-.366	.045	.421	.093
P. Physical Freedom	7	.136	.010	-.075	-.151	-.173	-.228	.080	.166
Indir. vs. Sil.& Conf.	8	.117	-.050	.012	.145	.127	.131	-.198	-.153
Unnamed	9	.158	.059	.222	.222	.218	-.108	.057	-.071
Iowa Tests of Basic Skills									
Vocabulary	10	--	.365	.572	.422	.517	-.330	-.420	.025
Reading	11		--	.297	.527	.450	-.411	-.001	.073
Arith. Concepts	12			--	.409	.779	-.170	-.220	-.236
Arith. Problems	13				--	.838	-.341	-.130	.039
Arith. Total	14					--	-.226	-.123	-.090
Children's Manifest Anxiety Scale									
Anxiety	15						--	-.014	-.326
L	16							--	-.063
Dependence-Proneness	17								--

*N = 55 $p < .05 = .26$ $p < .01 = .34$

Table 43 (Continued)

Correlations Between Classroom Process Factor Scores and Classroom Means for Low Dependence-Prone Group for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Activity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Process Factor Scores										
Teacher Criticism	1	-.096	-.100	-.115	-.027	-.036	.041	.193	-.153	-.090
Teacher vs P. Talk	2	.166	.021	-.204	-.072	-.011	-.323	.016	.162	.024
Disc. vs Rapid Inter.	3	.146	-.152	.061	.068	-.011	-.002	-.354	.113	-.026
P. Freedom in Disc.	4	-.120	-.373	-.209	-.090	-.106	-.069	.166	.050	-.071
Unnamed	5	-.189	-.057	-.301	-.186	-.063	-.123	.058	.235	.039
P. Host. vs P. Int.	6	-.254	-.297	-.206	.127	-.076	-.069	.055	.016	.008
P. Physical Freedom	7	-.306	-.372	-.178	-.120	-.094	-.034	-.073	-.155	-.214
Indir. vs. Sil. & Conf.	8	.369	.297	.145	-.071	.063	-.116	-.127	.095	.294
Unnamed	9	-.085	-.030	.261	.021	.043	.125	-.069	-.236	-.024
Iowa Tests of Basic Skills										
Vocabulary	10	-.023	-.170	.200	-.151	-.108	.370	-.129	-.183	-.006
Reading	11	-.065	-.073	.226	-.148	-.111	.273	-.050	-.278	.018
Arith. Concepts	12	.120	-.199	.188	-.058	-.052	.204	-.345	.032	.099
Arith. Problems	13	.063	.012	.337	-.217	-.037	.240	-.088	-.267	.071
Airth. Total	14	.150	-.069	.231	-.182	-.097	.294	-.236	-.111	.107
Children's Manifest Anxiety Scale										
Anxiety	15	.390	.168	-.147	.051	.200	-.240	-.052	.409	.150
L	16	-.269	-.113	-.120	-.047	-.138	-.028	.019	-.034	.158
Dependence-Proneness	17	-.229	.061	.026	.031	-.298	.092	.388	-.537	-.193

Table 43 (Continued)

Correlations Between Classroom Process Factor Scores and Classroom Means for Low Dependence-Prone Group for the First Project Year

		Minnesota Tests of Creativity			RSSR			My Class		
Measure		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Minnesota Tests of Creativity										
Non-Verbal	18	--	.429	.071	.062	.176	-.062	-.110	.170	.130
Product Improve.	19		--	.126	.112	.129	.181	-.062	.107	.227
Unusual Uses	20			--	.142	.142	.116	-.117	-.329	.157
Russell Sage Social Relations Test										
Activity	21				--	.364	.011	-.188	.176	-.061
Total	22					--	.059	-.224	.258	.218
Pupil Survey	23						--	.003	-.092	.061
My Class										
Halo	24							--	-.373	-.197
Disorder	25								--	.135
Climate	26									--

Table 44

Correlations Between Classroom Process Factor Scores and
Classroom Means for High Dependence-Prone Group for the First Project Year*

		Iowa Tests of Basic Skills							
				Arithmetic			CMAS		
		Vocab. 10	Read. 11	Con. 12	Prob. 13	Tot. 14	A 15	L 16	D-P 17
Process Factor Scores									
Teacher Criticism	1	-.165	-.032	-.308	-.324	-.339	-.348	.161	.328
Teacher vs P. Talk	2	-.057	-.083	-.060	-.075	-.063	-.055	-.158	-.121
Disc. vs Rapid Inter	3	.403	.210	.414	.145	.267	.033	-.177	-.224
P. Freedom in Disc.	4	.152	-.058	.229	-.137	.011	-.173	.030	.099
Unnamed	5	.017	-.150	-.094	-.064	-.099	-.248	-.071	.071
P. Host. vs P. Int.	6	-.117	.073	-.196	-.085	-.116	-.013	.450	.033
P. Physical Freedom	7	.193	.136	.052	.113	.062	-.075	.116	-.047
Indir. vs. Sil.& Conf.	8	.038	.122	.109	.091	.114	.020	-.353	-.192
Unnamed	9	.135	.117	.241	.110	.170	-.075	.005	-.124
Iowa Tests of Basic Skills									
Vocabulary	10	--	.306	.467	.334	.432	.092	-.217	-.144
Reading	11		--	.409	.526	.553	-.169	-.081	.206
Arith. Concepts	12			--	.527	.831	.129	-.266	-.309
Arith. Problems	13				--	.874	-.013	-.121	-.083
Arith. Total	14					--	.035	-.172	-.186
Children's Manifest Anxiety Scale									
Anxiety	15						--	.046	-.355
L	16							--	.030
Dependence-Proneness	17								--

*N = 55 $p < .05 = .26$ $p < .01 = .34$

Table 44 (Continued)

Correlations Between Classroom Process Factor Scores and
Classroom Means for High Dependence-Prone Group for the First Project Year

Measure		Minnesota Tests of Creativity			RSSR			My Class		
		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Acti-vity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Process Factor Scores										
Teacher Criticism	1	-.096	-.145	.011	-.027	-.036	-.159	.191	-.003	-.100
Teacher vs P. Talk	2	.112	.158	-.223	-.072	-.011	-.040	.020	.093	.190
Disc. vs Rapid Inter.	3	.162	-.049	-.017	.068	-.011	.166	-.320	.209	-.056
P. Freedom in Disc.	4	.013	-.042	-.132	-.090	-.106	.135	.345	.034	-.060
Unnamed	5	.131	.182	-.118	-.186	-.063	.067	.039	-.014	-.145
P. Host. vs P. Int.	6	-.172	-.252	-.209	.127	-.076	-.169	-.047	.255	-.046
P. Physical Freedom	7	-.036	-.287	-.086	-.120	-.094	.178	.014	.075	-.281
Indir. vs. Sil. & Conf.	8	.229	.216	.048	-.071	.063	-.106	-.175	.000	.348
Unnamed	9	-.119	-.091	.193	.021	.043	.202	.049	-.204	-.088
Iowa Tests of Basic Skills										
Vocabulary	10	-.044	-.115	.181	-.065	-.031	.403	-.033	.115	-.174
Reading	11	-.041	-.329	.050	-.063	-.070	-.075	-.019	-.207	-.182
Arith. Concepts	12	-.031	-.239	.182	-.117	-.051	.166	-.106	-.008	-.076
Arith. Problems	13	-.116	-.158	.157	-.171	-.090	.026	-.047	-.112	-.145
Airth. Total	14	-.108	-.243	.127	-.153	-.151	.027	-.093	-.080	-.150
Children's Manifest Anxiety Scale										
Anxiety	15	.077	.144	.159	-.040	.215	.000	-.174	.349	.188
L	16	-.289	-.266	-.076	.060	-.166	.113	.075	.080	-.118
Dependence-Proneness	17	.004	.202	-.160	-.017	-.149	-.031	.373	-.445	-.194

Table 44 (Continued)

Correlations Between Classroom Process Factor Scores and
Classroom Means for High Dependence-Prone Group for the First Project Year

		Minnesota Tests of Creativity			RSSR			My Class		
Measure		Non-Verbal 18	Prod. Impr. 19	Unus. Uses 20	Activity 21	Tot. 22	Pupil Surv. 23	Halo 24	Disor. 25	Clim. 26
Minnesota Tests of Creativity										
Non-Verbal	18	--	.431	.011	.049	.194	.153	.099	.123	.117
Product Improve.	19		--	.020	-.042	.221	.033	.155	-.022	.091
Unusual Uses	20			--	-.009	.088	.112	-.099	-.151	.093
Russell Sage Social Relations Test										
Activity	21				--	.364	-.015	-.220	.173	-.005
Total	22					--	-.054	-.082	.374	.011
Pupil Survey	23						--	.161	-.020	-.204
My Class										
Halo	24							--	-.222	-.124
Disorder	25								--	.155
Climate	26									--

group it was -.31, with the value for the total group approximately midway between. Again, we have an instance of the low dependent group being more hampered by negative classroom conditions than the high dependent group.

Summary of Subgroup Correlations. Probably the conservative conclusion to draw from these results is that there really have not been differences of any consequence between the subgroups. Although a scattering of differences have been reported, in expected directions, there also have been results which ran counter to expectations.

Some of the results which followed expectation suggested another dimension to the interaction which was hypothesized in explaining the results of the Climate and Control analysis of variance. Those results were interpreted by hypothesizing task differences in the level of stress which was optimal for learning. Reading, for example, appeared to be learned under a higher level of stress than Vocabulary. Some of the results of these analyses suggest that the anxiety level of the pupil interacts with classroom process and task to affect learning. The suggestion of this effect appeared for the low anxious pupils for whom indirect teaching was more facilitative of growth in Product Improvement than for the total group, and more for the total group than for the high anxious group. To complete the picture, achievement measures did not relate to indirect teaching. In this case, then, task made a difference (Product Improvement vs. subject-matter), indirect teaching made a difference, but only for low anxious pupils, so that the interaction of all three — anxiety level, indirectness of teaching, and task are suggested.

Although the results presented here are at best doubtful of meaning, the tendency for pieces of results to fall into the pattern of interpretation in terms of interaction of task and tension level lends support to this idea.

Analysis of Mean Growth Over Two Years

The results presented here are the outcomes of a series of analyses of variance whose goal was to examine the cumulative effect of different sequences of classroom conditions over two years. They used factor scores derived from the second factor analysis of the process data. The same measures which had been combined with equal weighting to obtain the nine factor scores for the first year data were employed with the second year data to produce similar factor scores for the teachers for the second year of the project. The four factors which had correlated most clearly with pupil change the first year were selected for study over the two year period, and used to identify teachers who were high, middle, and low on each factor each year. Then pupils were identified who were in classrooms high on Factor 1 (Teacher Criticism) both years, low both years, low to middle, and all the other possible combinations. The same process was carried out for each of the other three factors for the two years.

Pupil measures of residual true gain for the two separate years were summed in order to yield a total residual true gain for the two years of the project. Five measures were selected for analysis from the product measures: Vocabulary and Arithmetic Concepts, representing subject-matter achievement; Anxiety and the L score representing the personality measures; and Product Improvement, representing change in creativity.

Factor 1, Teacher Criticism. Since the results appear to be similar in numbers of ways across all of the analyses of the results for Factor 1, they will be discussed as a group. This is in keeping, as well, with a point of view of interpreting trends across a series of analyses, recognizing that when large numbers of significance tests are calculated as has been done here, the results of individual tests will be less meaningful than they would be if small numbers had been calculated. The results for Factor 1, Teacher Criticism, are shown in Tables 45 through 49.

The clearest result which appears to emerge from the analyses of growth in achievement and creativity seemsto be that the second year is the influence which is consistently significant. In one analysis the first year's growth had a significant influence, and in one the interaction had a significant influence, but in all three the second year made a difference significant at the one per cent level. For the second year data, high teacher criticism produced the least growth of all for all three analyses. Although the results differ somewhat from analysis to analysis, it often appeared that the low and middle levels of criticism did not differ widely in their results, but the larger difference appeared to be that for high teacher criticism,which produced the least growth. The significant interaction between the two years for Arithmetic Concepts did not appear to show any regular pattern.

For Product Improvement, for which the first year influence was significant at the five per cent level, the middle level of teacher criticism produced the least growth. The two trends which appear to be

Table 45

Analysis of Variance of Pupil Change Over Two Years in Vocabulary in Classrooms Differing in Factor 1, Teacher Criticism

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	105.25	52.63	1.89
Second Year	2	549.90	274.95	9.87**
Interaction	4	140.51	35.13	1.26
Error	369	10274.73	27.84	
Total	377	11070.39		

$^{**}p < .01$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	18.05	19.05	16.05	17.71
	Middle	17.52	17.33	15.52	16.79
	Low	17.17	20.50	16.45	18.04
	Total	17.58	18.96	16.01	17.52

Table 46

Analysis of Variance of Pupil Change Over Two Years in Arithmetic Concepts in Classrooms Differing in Factor 1, Teacher Criticism

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	25.04	12.52	----
Second Year	2	462.10	231.05	13.26**
Interaction	4	165.06	41.26	4.73**
Error	369	6430.06	17.43	
Total	377	7082.26		

$^{**}p < .01$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	16.60	16.67	13.38	15.55
	Middle	17.45	14.93	13.98	15.45
	Low	16.21	16.79	15.12	16.04
	Total	16.75	16.13	14.16	15.68

Table 47

Analysis of Variance of Pupil Change Over Two Years in Product Improvement in Classrooms Differing in Factor 1, Teacher Criticism

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	133.88	66.94	3.92*
Second Year	2	169.12	84.56	4.95**
Interaction	4	99.79	24.95	1.46
Error	369	6303.80	17.08	
Total	377	6706.59		

*$p < .05$
**$p < .01$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	7.64	8.00	6.81	7.48
	Middle	5.90	8.31	5.12	6.44
	Low	7.71	8.14	7.69	7.85
	Total	7.09	8.15	6.54	7.26

Table 48

Analysis of Variance of Pupil Change Over Two Years in Anxiety in Classrooms Differing in Factor 1, Teacher Criticism

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	99.87	49.94	1.02
Second Year	2	1037.48	518.74	10.64**
Interaction	4	312.89	78.22	1.60
Error	369	17986.31	48.74	
Total	377	19436.55		

**p<.01

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	-3.64	-8.14	-5.45	-5.75
	Middle	-5.40	-6.76	-2.45	-4.87
	Low	-6.26	-8.48	-3.55	-6.10
	Total	-5.10	-7.79	-3.82	-5.57

Table 49

Analysis of Variance of Pupil Change Over Two Years in CMAS: L in Classrooms Differing in Factor 1, Teacher Criticism

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	0.23	0.11	----
Second Year	2	18.37	9.19	4.24*
Interaction	4	4.68	1.17	----
Error	369	799.57	2.17	
Total	377	822.85		

*$p < .05$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	-0.95	-1.24	-0.36	-0.85
	Middle	-0.88	-1.12	-0.69	-0.89
	Low	-0.79	-1.02	-0.71	-0.84
	Total	-0.87	-1.13	-0.59	-0.86

clearest across the three analyses seem to be that high teacher criticism produced the least growth, and this trend is clearer the second year than the first.

Perhaps what is really relevant in the latter influence is that the second year is the current year, which suggests that what went on the year earlier matters less in the amount of growth shown over two years than the more recent influences do.

For the measures of A and L, the results are similar to those for growth. The second year is the year whose influence is significant in both cases; the over-all trend is for both Anxiety and L to decline over the two years, but the decline is least for the high teacher criticism classes the second year. The greatest decline in both A and L occurred for middle level teacher criticism for the second year. While it may not be significantly different from the influence of low teacher criticism condition, the consistency of the occurrence (the middle level was also optimal for Vocabulary and Product Improvement, as well as both personality measures) suggested it may be meaningful. When it is recalled that these were classrooms which were probably unusually low in the amount of criticism which was present, as indicated in earlier results; and when the variability around that mean is taken into account, it may be that the classes which are lowest in criticism really represent classroom conditions which are less than optimal for desirable pupil change. It seems reasonable to assume that this limited amount of criticism represents control of only the most deviant pupil behavior. Perhaps what is suggested here, then, is that at least a minimum of control of deviant behavior is both necessary and desirable from the pupil point of view. Perhaps the optimum of teacher criticism is more than the least which is represented here.

In line with these hypotheses, it is interesting to look at the table of cell means for the anxiety data and note that to go from either high or low teacher criticism the first year to an intermediate level the second year appears to be the most desirable circumstance. To continue in a high classroom two years is not very different from continuing in a low classroom for two years. And apparently the most devastating condition is to go from a middle criticism classroom (hypothesized as optimal) to a high criticism classroom (characterized as most non-optimal). It is also interesting to note that continuing the same condition appears to be a relatively satisfactory circumstance -- namely, low-low, middle-middle, high-high differ relatively little in the outcome. While it is clear that the changes being considered among the cell means may not be significant, they appear to make a measure of sense, in conjunction with the differences which do seem to be significant for the second year.

Factor 3. Extended Discourse (vs. Rapid Teacher-Pupil Interchange). The results are presented in Tables 50 through 54. For Vocabulary, the sequences were clear cut -- higher levels of extended discourse produced more growth both years. For Arithmetic Concepts only the influence of the first year was significant, and the order again was for higher levels of extended discourse to produce more growth. For Product Improvement, however, the trend appeared to be in the other direction -- only the first year had a significant influence, and there high extended discourse produced the least growth, and the middle level, the most. The interaction was also significant, but the major difference within the cell means ap-

Table 50

Analysis of Variance of Pupil Change Over Two Years in Vocabulary in Classrooms Differing in Factor 3, Extended Discourse (vs. Rapid Teacher-Pupil Interchange)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	425.32	212.66	7.42**
Second Year	2	310.18	155.09	5.41**
Interaction	4	200.24	50.06	1.75
Error	306	8764.34	28.64	
Total	314	9700.07		

**p<.01

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	19.57	18.43	20.71	19.57
	Middle	16.60	16.89	18.54	17.34
	Low	14.40	17.86	18.51	16.92
	Total	16.86	17.72	19.26	17.95

Table 51

Analysis of Variance of Pupil Change Over Two Years in Arithmetic Concepts in Classrooms Differing in Factor 3, Extended Discourse (vs. Rapid Teacher-Pupil Interchange)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	156.67	78.34	4.10*
Second Year	2	27.32	13.66	----
Interaction	4	200.55	50.14	2.62
Error	306	5853.25	19.13	
Total	314	6237.79		

*$p < .05$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	17.89	16.60	15.91	16.80
	Middle	14.97	15.86	15.17	15.33
	Low	13.63	16.14	16.06	15.28
	Total	15.50	16.20	15.71	15.80

Table 52

Analysis of Variance of Pupil Change Over Two Years in Product Improvement in Classrooms Differing in Factor 3, Extended Discourse (vs. Rapid Teacher-Pupil Interchange)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	127.51	63.76	3.70*
Second Year	2	94.58	47.29	2.74
Interaction	4	314.09	78.52	4.56**
Error	306	5272.34	17.23	
Total	314	5808.52		

*$p < .05$
**$p < .01$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	6.00	5.86	7.97	6.61
	Middle	10.23	7.34	6.80	8.12
	Low	8.51	8.00	6.54	7.69
	Total	8.25	7.07	7.10	7.47

Table 53

Analysis of Variance of Pupil Change Over Two Years in Anxiety
in Classrooms Differing in Factor 3, Extended Discourse
(vs. Rapid Teacher-Pupil Interchange)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	214.69	107.34	2.13
Second Year	2	270.53	135.27	2.68
Interaction	4	217.18	54.29	1.07
Error	306	15455.76	50.51	
Total	314	16158.16		

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	-5.00	-5.14	-8.91	-6.35
	Middle	-4.29	-4.63	-4.31	-4.41
	Low	-4.31	-6.20	-7.09	-5.87
	Total	-4.53	-5.32	-6.77	-5.54

Table 54

Analysis of Variance of Pupil Change Over Two Years in CMAS: L in Classrooms Differing in Factor 3, Extended Discourse (vs. Rapid Teacher-Pupil Interchange)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	5.03	2.52	1.20
Second Year	2	4.50	2.25	1.12
Interaction	4	21.59	5.40	2.57*
Error	306	643.20	2.10	
Total	314	674.33		

*$p < .05$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	-1.23	-0.94	-0.91	-1.03
	Middle	-1.31	-0.77	-0.69	-0.92
	Year	-0.34	-1.26	-0.57	-0.72
	Total	-0.96	-0.99	-0.72	-0.89

peared to be that the combination of middle for the first year and low the second year produced the most growth.

Perhaps it is not entirely surprising that creativity measures should differ from the achievement measures on this factor, since it is primarily one of "teaching" behavior. At one end there is teacher involvement in repeated relatively short cycles of teacher presentation followed by pupil interaction, while the other pole represents drill activities, again teacher directed. Optimal growth in creativity seems to take place where neither of these activities is particularly predominant in the classroom.

For the Anxiety measure, none of the differences were significant, although the trends were in the direction of higher levels of extended discourse producing greater reduction in anxiety. For the L measure, the interaction was significant, but the pattern is not clear. However, the differences are small, and the result barely significant.

Factor 6. Pupil Hostility (vs. Teacher Support and Pupil Interest). The results are presented in Tables 55 through 59. For Vocabulary and Arithmetic Concepts, only the second year was significant, with the least growth under high hostility, but a slight tendency for the most growth under middle hostility. Although the first year influence was not significant, the order was again consistent with higher levels of hostility producing less growth. For Product Improvement, neither year alone produced a significant influence, but the interaction, significant at the one per cent level, appears to be a function of two years of high pupil hostility producing materially less growth in Product Improvement than any of the other combinations of conditions.

Table 55

Analysis of Variance of Pupil Change Over Two Years in Vocabulary in Classrooms Differing in Factor 6, Pupil Hostility (vs. Teacher Support and Pupil Interest)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	150.51	75.26	2.42
Second Year	2	215.45	107.73	3.46*
Interaction	4	164.60	41.15	1.32
Error	405	12612.62	31.14	
Total	413	13143.18		

$^{*}p < .05$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	16.37	17.41	17.11	17.00
	Middle	18.17	19.20	16.43	17.93
	Low	19.43	18.96	16.84	18.41
	Total	18.00	18.52	16.80	17.77

Table 56

Analysis of Variance of Pupil Change Over Two Years in Arithmetic Concepts in Classrooms Differing in Factor 6, Pupil Hostility (vs. Teacher Support and Pupil Interest)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	24.38	12.19	----
Second Year	2	103.90	51.95	3.18*
Interaction	4	164.89	41.22	2.52
Error	405	6615.91	16.34	
Total	413	6909.08		

*$p < .05$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	14.70	16.67	14.57	15.31
	Middle	15.63	15.43	15.17	15.41
	Low	17.16	15.72	14.74	15.87
	Total	15.83	15.94	14.83	15.53

Table 57

Analysis of Variance of Pupil Change Over Two Years in Product Improvement in Classrooms Differing in Factor 6, Pupil Hostility (vs. Rapid Teacher-Pupil Interchange)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	79.36	39.68	2.11
Second Year	2	102.57	51.28	2.73
Interaction	4	314.90	78.72	4.19**
Error	405	7614.04	18.80	
Total	413	8110.86		

$^{**}p < .01$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	7.15	8.98	4.87	7.00
	Middle	7.98	7.72	7.35	7.68
	Low	8.02	7.63	8.52	8.06
	Total	7.72	8.11	6.91	7.58

Table 58

Analysis of Variance of Pupil Change Over Two Years in Anxiety in Classrooms Differing in Factor 6, Pupil Hostility (vs. Teacher Support and Pupil Interest)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	21.86	10.93	----
Second Year	2	262.53	131.26	2.75
Interaction	4	430.97	107.74	2.10
Error	405	20779.71	51.31	
Total	413	21495.07		

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	-2.89	-6.87	-6.57	-5.44
	Middle	-4.54	-5.96	-4.63	-5.04
	Low	-6.28	-6.52	-3.96	-5.59
	Total	-4.57	-6.45	-5.05	-5.36

Table 59

Analysis of Variance of Pupil Change Over Two Years in CMAS: L in Classrooms Differing in Factor 6, Pupil Hostility (vs. Teacher Support and Pupil Interest)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	9.18	4.59	2.22
Second Year	2	11.71	5.85	2.84
Interaction	4	16.88	4.21	2.04
Error	405	835.89	2.07	
Total	413	873.66		

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	-0.87	-0.74	-0.54	-0.72
	Middle	-0.74	-1.41	-0.43	-0.86
	Low	-0.87	-1.20	-1.17	-1.08
	Total	-0.83	-1.12	-0.72	-0.89

For the personality measures, none of the influences were significant, nor were there trends which appeared to follow any consistent patterns.

Factor 8, Indirect Teaching (vs. Silence and Confusion). The results are presented in Tables 60 through 64. For both achievement measures, it was the first year that was significant; the second year did not approach significance but the interaction was highly significant. For both Vocabulary and Arithmetic Concepts the greatest growth appeared for the intermediate value of indirect teaching for the first year. When the cell means for vocabulary are examined, the highest values in every case (those of twenty or near twenty) are for conditions which involve a middle level of indirect teaching one year of the other. Although not greatly different from the other cells, it is interesting to notice that the high-high cell had the lowest growth of all.

For Arithmetic Concepts, in addition to the intermediate level being significantly better for the first year, the higher values among the cell means involve a middle level one year or the other, or two years of low indirect teaching. Again, the high-high combination is one of the lower values for the table.

The results for Product Improvement, however, were quite different. It was the second year which made the significant difference for it, and the higher the level of indirect teaching, the higher the growth in creativity. Although it is probably not significantly different from several other values in the table, the highest growth of all occurred in the high-high combination among the cell means.

The finding of the intermediate levels of indirect teaching producing

Table 60

Analysis of Variance of Pupil Change Over Two Years in Vocabulary in Classrooms Differing in Factor 8, Indirect Teaching (vs. Silence and Confusion)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	551.42	275.71	10.04**
Second Year	2	97.06	48.53	1.77
Interaction	4	1481.61	370.40	13.49**
Error	603	16560.15	27.46	
Total	611	18690.24		

**p<.01

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	16.35	19.79	15.25	17.13
	Middle	20.01	16.63	20.44	19.03
	Low	18.38	16.03	16.34	16.92
	Total	18.25	17.49	17.34	17.69

Table 61

Analysis of Variance of Pupil Change Over Two Years in Arithmetic Concepts in Classrooms Differing in Factor 8, Indirect Teaching (vs. Silence and Confusion)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	126.40	63.20	3.58*
Second Year	2	62.95	31.48	1.78
Interaction	4	369.55	92.39	5.23**
Error	603	10659.06	17.68	
Total	611	11217.96		

*$p < .05$
**$p < .01$

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	15.07	16.38	14.78	15.41
	Middle	16.09	15.25	16.65	16.00
	Low	16.03	13.32	15.29	14.88
	Total	15.73	14.99	15.57	15.43

Table 62

Analysis of Variance of Pupil Change Over Two Years in Product Improvement in Classrooms Differing in Factor 8, Indirect Teaching (vs. Silence and Confusion)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	7.90	3.95	----
Second Year	2	352.36	176.18	10.21**
Interaction	4	105.67	26.42	1.53
Error	603	10400.35	17.25	
Total	611	10866.27		

**p<.01

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	6.43	6.97	8.82	7.41
	Middle	6.41	7.56	7.72	7.23
	Low	6.22	8.35	7.94	7.50
	Total	6.35	7.63	8.16	7.38

Table 63

Analysis of Variance of Pupil Change Over Two Years in Anxiety in Classrooms Differing in Factor 8, Indirect Teaching (vs. Silence and Confusion)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	954.32	477.16	9.32**
Second Year	2	34.83	17.41	----
Interaction	4	867.64	216.91	4.24**
Error	603	30872.79	51.20	
Total	611	32729.57		

**p<.01

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	-4.16	-7.31	-3.56	-5.14
	Middle	-6.46	-5.56	-8.87	-6.96
	Low	-4.40	-3.60	-3.76	-3.92
	Total	-5.00	-5.49	-5.53	-5.34

Table 64

Analysis of Variance of Pupil Change Over Two Years in CMAS: L in Classrooms Differing in Factor 8, Indirect Teaching (vs. Silence and Confusion)

Analysis of Variance

Source of Variation	df	Sums of Squares	Mean Squares	F
First Year	2	12.87	6.43	3.13*
Second Year	2	0.98	0.49	----
Interaction	4	7.70	1.93	----
Error	603	1240.44	2.06	
Total	611	1261.99		

*p<.05

Residual True Gain Means

		Second Year			
		Low	Middle	High	Total
First Year	High	-0.57	-0.81	-0.78	-0.72
	Middle	-1.21	-0.82	-1.19	-1.07
	Low	-0.87	-0.88	-0.84	-0.86
	Total	-0.88	-0.84	-0.94	-0.89

more growth for subject-matter achievement should probably be interpreted in the light of the level of indirect teaching in these schools. As reported previously, these were on the average quite indirect schools, and it may be that just as the least criticism produced less growth, perhaps also the least teacher direction may reflect less teacher control than is optimal for pupil growth. Perhaps it is not surprising either, that the optimal level for growth in creativity should be less teacher direction than the level which is optimal for growth in subject-matter. Presumably this is a more individual kind of learning, a divergent kind of learning, and perhaps it is less in need of environmental structuring.

For Anxiety, again the middle level of indirectness produced the greatest decrease in anxiety, and the significant influence is that of the first year. The interaction was significant, and the pattern appeared to be one in which the greatest decreases in anxiety took place in those cell means which involved an intermediate level of indirect teaching for one year or the other. For L, only the first year had a significant influence, and again it was the intermediate level of indirect teaching which produced the greatest decline in L.

Summary of Mean Growth Over Two Years. Several trends appear to be of interest in these analyses. One, is that apparently the expressions of negative affect in the classroom had their primary influence in the near past. That is, it was this year whose expression of hostility by either the teacher or the pupil appeared to make the larger difference. For the factors involving indirect teaching or extended discourse, it was more often the first year influence which was significant. It is not clear why this should have been true, except as an expression of a long-term growth process, the results of which are more clearly apparent after longer periods of time.

The other trend of interest which appeared through three of the sets of analyses, seemed to indicate that in these classrooms intermediate levels of teacher control, expressed either as criticism or as indirect teaching, produced more pupil change in desirable directions than did extreme lack of teacher control. Perhaps the explanation is the need for the teacher to provide a minimum of structure within which pupil growth will be maximized.

Process and Product Measures Factor Analyzed Together

Another of the analyses carried out with the process and product measures was to factor analyse them in the same analysis. This was done both for the additional information that it might provide in describing dimensions of teacher classroom behavior which relate to measures of pupil change, but also so that these dimensions of classroom process and outcome could be used as criterion scores for studying change in teacher behavior as a consequence of sensitivity training. The correlation and factor matrices produced are shown in Appendix A.

The results that follow are descriptions of the factors which emerged from the analysis. Whereas in the analysis of process measures, only loadings of .5 or larger were used in factor scores, in this case loadings of .3 or larger were used, since a higher cut-off would have excluded much of the cross-over between process and product measures. This fact would seem to be of interest in itself, since it suggests that the relations within the cluster of process measures and within the cluster of product measures may be somewhat higher than the relations between these two clusters.

For bipolar factors, the first-named pole is the one given positive weight in calculating factor scores.

Factor 1. Pupil Physical Freedom vs. Creativity Growth.

No.		Loading
9	Total autonomous groups	.75
8	Free movement	.65
16	Silence and confusion	.39
2	Pupil interest-attention rating	-.38
29	Anxiety	-.39
32	Non-verbal creativity	-.62
33	Product Improvement	-.67

The clearest thread running through this series of measures is similar to that found between one of the process factors and several of the product measures -- the finding that pupil physical freedom in the classroom led to decrease in creativity. In interpreting this result, it should be remembered that this was apparently a group of classrooms in which teaching was unusually indirect, and pupils had a great measure of freedom. It seems probable that it would be in only an unusually free set of classrooms that the negative relationships found here would occur. Probably the relationship involved is a curvilinear one for which only very high levels of pupil freedom result in decreased growth.

Factor 2. Inquiry and Student Talk vs. Drill and Teacher Talk.

No.		Loading
21	Inquiry/drill ratio	.94
20	Inquiry	.90
18	Student talk prolonged	.87
36	Halo	-.32
19	Drill	-.39
17	Student talk following teacher talk	-.45
10	Teacher activity/student activity	-.61

The measure of inquiry has a title which is somewhat inferential -- it is made up of extended teacher acceptance of pupil idea, extended questioning, extended pupil response, and extended pupil initiation. The rationale is that this particular pattern of behaviors would be likely to be associated with more abstract conceptual learning than rote memory, and learning in which pupil activity is relatively high. The other pole of the factor appears to be teacher activities which to a very large degree are made up of drill and pupil talk in response to teacher instructions. This factor has considerable similarity to the Extended Discourse vs. Rapid Teacher Pupil Interchange factor from the process analysis, but the only measure of achievement which approached the minimum loading was that for Arithmetic Concepts with a loading of .25.

Factor 3. Drill vs. Extended Teacher Talk.

No.		Loading
16	Silence and confusion	.50
17	Student talk following teacher talk	.47
19	Drill	.47
36	Halo	.43
18	Student talk prolonged	.42
10	Teacher activity/student activity	-.71
11	Extended elaboration of pupil idea	-.72
13	Extended lecture	-.80

This is a factor which has several of the same measures in it which were present in Factor 2, but the major distinction appears to be that while Factor 2 had teacher activity on one end and pupil activity at the other, Factor 3 has teacher activity on both ends of the factor, but different sorts of teacher activity. Although this factor also has a number of parallels to the Extended Discourse Factor from the process analysis, it does not have any product loadings which reached the minimum level.

Factor 4. Indirect Teaching vs. Dependence-Proneness.

No.		Loading
31	Dependence-Proneness	.87
36	Halo	.44
3	Teacher verbal hostility	.36
37	My Class Disorder	-.60
29	Anxiety	-.69
12	Extended indirect	-.70

The factor is defined by Dependence-Proneness at one pole with a constellation of extended indirect teacher behavior, increase in anxiety, and pupil perception of disorder at the other end. Apparently what is represented is that extended indirect teaching produces an increase in anxiety, and the perception of disorder in the classroom for the pupils, but at the same time decreases dependency and to some degree the pupils dislike the teacher. The level of indirectness of this group of classrooms again is relevant to this finding.

Two product measures, Reading and Arithmetic Concepts had loadings almost high enough to be included on the factor, but Concepts loaded with the extended indirect pole of the factor, while Reading loaded with the opposite pole. This is reminiscent of the difference in response of these two measures to the classroom conditions which were analysed in the initial analyses of variance of Climate, Control and Grade Level.

Factor 5. Drill vs. Disorder.

No.		Loading
24	Revised disorder	.95
15	Vicious Circle	.94
16	Silence and confusion	.38
34	Unusual Uses	-.33
19	Drill	-.34
17	Student talk following teacher talk	-.35

5

The loading of Vicious Circle with revised/disorder and silence and confusion appears to represent the attempt of the teacher to deal with discipline problems, apparently unsuccessfully. The other pole of the factor has loadings for drill-type activities, but with Unusual Uses associated with them. While this may represent to some degree order in the classroom, within which creativity develops, as has been reported in relation to other factors, another possibility also seems reasonable. That is that Unusual Uses represents a kind of compliant behavior which might be fostered in the teacher-directed classroom. Unusual Uses was the last of the series of creativity measures administered, and being a written test, numbers of pupils did not complete it. Project staff had wondered whether this measure had unwittingly become a measure of compliance or persistence, and some of its relationships with other measures make that interpretation seem reasonable.

Factor 6. Conceptual and Supportive.

No.		Loading
2	Pupil interest-attention rating	-.30
6	Teacher non-verbal affection	-.31
27	Arithmetic Concepts	-.31
4	Pupil verbal hostility	-.33
7	Pupil verbal affection	-.69
1	Teacher encourages interpretation, generalization, solution	-.84

The teacher encourages interpretation, generalization, problem solution measure is one which was used in contrast to the teacher quest for factual material, and represents a striving for higher level educational goals. A series of affect factors, mostly supportive, are associated with it, although there is a minimal loading for pupil verbal hostility. It would not be surprising that in a supportive climate some expression of hostility should take place as a "making use of" a free supportive situation.

It is reasonable and in line with the early analysis of variance that Arithmetic Concepts growth was associated with supportive emotional climate and teacher interest in abstract learning.

Factor 7. Interest and Learning vs. Pupil Hostility.

No.		Loading
5	Pupil non-verbal hostility	.86
4	Pupil verbal hostility	.72
30	L	.59
3	Teacher verbal hostility	.40
27	Arithmetic Concepts	-.32
25	Vocabulary	-.33
6	Teacher non-verbal affection	-.36
2	Pupil interest-attention rating	-.59

This factor seems relatively clear in its interpretation, with pupil hostility, some teacher hostility, and pupil self-description as conforming to adult standards at one end of the factor, and pupil interest attention, Vocabulary and Arithmetic Concepts learning, and teacher support comprising the other end. Again, it has elements in common with the pupil hostility factor from the process analysis, although not as many of the product measures load on this analysis as correlated with the factor in the previous analysis.

Factor 8. Pupil Initiation vs. Drill.

No.		Loading
19	Drill	.59
16	Silence and confusion	-.37
23	Pupil initiation following teacher indirect	-.91
22	Pupil interrupts	-.92

This appears to be a relatively clear factor — another aspect of teacher control vs. pupil freedom in the classroom, with drill loading oppositely to two kinds of pupil initiation. The silence and confusion measure appears to be a reasonable concomitant of a classroom in which there is free pupil discussion.

Factor 9. Pupil Independent Work.

No.		Loading
33	Product Improvement	-.30
25	Vocabulary	-.49
6	Teacher non-verbal affection	-.55
35	Pupil Survey	-.85

Pupil Survey, which defines the factor, is a pupil self-report of the amount of work he has done outside of class, related to class work, but not assigned by the teacher. It seems very reasonable that this sort of self-initiated work should be associated with teacher support and with growth in Vocabulary and Product Improvement, both of which probably are independent kinds of growth.

Factor 10. Group Skill vs. L.

No.		Loading
38	Russell Sage Social Relations--Total	.75
39	Russell Sage Social Relations--Activity	.59
32	Non-Verbal Creativity	.36
30	L	-.36

Probably what is represented in this factor is the internalization of control by the pupil groups, which fosters growth in creativity, and which lessens the need (L) for the child to refer to adult standards in describing himself.

Factor 11. Achievement Gain.

No.		Loading
39	Russell Sage Social Relations--Activity	.35
17	Student talk following teacher talk	.33
37	My Class Disorder	.30
34	Unusual Uses	-.34
25	Vocabulary	-.53
27	Arithmetic Concepts	-.55
28	Arithmetic Problems	-.76
26	Reading	-.84

Although this appears to be a clear pupil achievement gain factor, the order in which the different kinds of achievement loaded suggests a more teacher directed kind of achievement. This is, the loadings fall in an approximate inverse order to the abstractness of the task and the independence of the kind of achievement which is represented. The analysis of variance of Grade Level, Climate and Control for the first year suggested that Reading, for example, showed most gain under more directive classroom conditions than did Vocabulary or Arithmetic Concepts. According to the interpretations made in that section, the more abstract and self-directed the learning, the less teacher direction facilitated it.

The loading for Unusual Uses on this factor is uncertain in meaning, but the interpretation has been suggested earlier that it may have considerable contamination of compliance to teacher direction. Perhaps this is why it appears on this factor.

By this interpretation, the achievement gain which is represented in this factor is, to a considerable degree, teacher-directed achievement gain, and probably this is why the Russell Sage Activity Measure, the teacher-pupil interaction represented in Student talk following teacher talk, and Disorder load oppositely. These latter loadings were low and the interpretation was somewhat uncertain. As a consequence, the minor pole of the factor was not named.

Factor 12. Unnamed.

No.		Loading
14	Extended teacher criticism	.80
3	Teacher verbal hostility	.48
34	Unusual Uses	.44

Although the factor seems marginally reasonable since the two measures of teacher criticism go together, and since the Unusual Uses creativity measure has been suggested as a compliant, following-directions kind of measure , to some degree the interpretation seems sufficiently uncertain as not to warrant naming the factor.

Factor Score Stability. An item of information which became available as a consequence of having calculated factor scores for the classrooms for each of the two years was the possibility of looking at the correlations of the factor scores from one year to the next. The stabilities of the process factor scores were shown in Table 21, and those of the process product factor scores in Table 65.

The clearest conclusion to be drawn from the tables appears to be that the different aspects of classroom process differ considerably in their stability. Probably the frame of reference that comes to mind most immediately is the reliability of paper and pencil tests, but this may not be the most appropriate one. It is not unusual, for example, to find that the intercorrelations of grades earned one year may not correlate above .50 with grades earned another year. And since these are often data based on pencil and paper responses the question may be relevant of whether paper and pencil responses tend to be more stable than other behavioral responses.

Aside from the extreme variability of the stability coefficients shown, another aspect of the data which seems worthy of note is that the factors which represent expression of affect appear generally to be among the more stable factors. Apparently from the results of the process factor scores a teacher who is hostile one year is quite likely to be hostile the next, and the teacher who has hostile pupils one year is apparently likely to have hostile pupils the next. It also seems notable

Table 65

Stability of Process-Product Factor Scores Over Two Years

Factor	Description	r
1	Creativity Growth vs Pupil Physical Freedom	.60
2	Inquiry and Student Talk vs Drill and Teacher Talk	.11
3	Drill vs Extended Teacher Talk	.70
4	Indirect Teaching vs Dependence-Proneness	.21
5	Drill vs Disorder	.02
6	Conceptual and Supportive	.36
7	Interest and Learning vs Pupil Hostility	.54
8	Pupil Initiation vs Drill	.34
9	Pupil Independent Work	.43
10	Group Skill vs L	.06
11	Achievement Gain	.09
12	Unnamed	.36

from the process-product factor score results that one of the least stable measures is that of the achievement gain of the pupils with whom a teacher works each year — a correlation of .09 from one year to the next. While these achievement scores were scores which had stable characteristics of the pupil extracted statistically, it seems possible that other aspects of the pupil which related to his gain may not have been identified, and that influences involved in the assignment of pupils to teacher from one year to the next which have not been measured may be quite important in this low stability coefficient.

Another question which is relevant to these data is that of the reliability of observers. Observer reliability separate from consistency of teacher behavior within each year was not assessed, and consequently cannot be taken into account in these data. It does seem relevant to note, however, that Pupil Physical Freedom, Factor 7 in the process analysis, is made up of physical movement of pupils in the classroom, as well as two items which have to do with the formation of groups in the classroom, and one of non-verbal expression of affection. While the latter might be difficult to observe reliably, it would seem that the other three should be among the items more reliably observed. Yet this factor was one of the lower ones in stability (.36). Also relevant to this point is Factor 4 from the process-product analysis, Indirect Teaching vs. Dependence-Proneness. Extended indirect teacher behavior is the only behavioral item of the factor; the others are pupil response items from three different inventories, yet the stability of this factor across the two years is only .21. Perhaps against these backgrounds, the stabilities of the teacher behavior factors should be seen as more acceptable.

It still remains true, however, that consistency of teacher behavior from one year to the next is to a very considerable degree a function of the aspects of behavior which are being observed.

Relation of Presage to Process and Product Measures

The Minnesota Multiphasic Personality Inventory, as the most studied structured personality measure, and years of experience in education, semester hours in education courses, and National Teacher Examinations scores were selected as representing what are probably some of the most used measures of teacher characteristics employed in the selection and evaluation of teachers. Although past studies relating these to classroom variables have shown mixed results, these measures were included for analysis with the thought that the broader sampling of process and product measures combined into dimensions might relate more clearly to the presage measures. For bipolar factors, the first named pole was associated with high scores on the factor.

Relation of Presage Measures to Process-Product Factor Scores

It was expected that the process-product factor scores might provide both a more reliable and more representative sampling of classroom measures, and the relations between these and the presage measures were the analysis of particular interest. These results are shown in Table 66. Thirteen of the relationships were significant beyond the five per cent level. Since there were 228 relationships presented, eleven or twelve would be expected to be significant at that level by chance. In addition, study of the relationships suggest that approximately as many are counter to the expected direction as are in line with it, consequently,

Table 66

Relation of Teacher Presage Measures to Process-Product Factor Scores

Process-Product Factor Score		Minnesota Multiphasic Personality Inventory									
		K	Hs	D	Hy	Pd	Mf	Pa	Pt	Sc	Ma
Creativity Growth vs Pupil Physical Freedom	1	-.23	-.18	.30*	-.09	-.03	-.20	-.07	-.01	-.18	-.21
Inquiry and Student Talk vs Drill and Teacher Talk	2	-.11	.12	.32*	.10	.12	-.30*	.17	.29*	-.00	.10
Drill vs Extended Teacher Talk	3	-.03	-.23	-.19	-.04	-.10	-.02	.03	-.28*	-.19	.22
Indirect Teaching vs Dependence-Proneness	4	.18	.06	.26	-.00	.22	-.02	.05	.22	.17	-.21
Drill vs Disorder	5	-.13	-.03	.01	.05	-.00	.26	.07	-.15	.01	-.03
Conceptual and Supportive	6	-.02	.06	.03	.22	.05	-.18	.08	-.01	-.04	-.03
Interest and Learning vs Pupil Hostility	7	.05	.04	.28*	.11	-.02	-.12	.08	-.01	-.04	-.03
Pupil Initiation vs Drill	8	.10	.01	-.14	-.05	-.08	-.17	-.12	.01	.00	.16
Pupil Independent Work	9	-.04	.02	.12	.03	-.13	-.07	.06	.08	-.13	-.03
Group Skill vs L	10	-.10	.06	.22	.02	-.05	-.11	-.15	.02	-.03	-.08
Achievement Gain	11	-.15	.22	.11	.20	-.02	-.23	.22	.20	.04	.24
Unnamed	12	-.34*	.14	-.02	.07	-.21	-.07	.03	.07	-.01	.08

$*p < .05$
$**p < .01$

Table 66 (Continued)

Relation of Teacher Presage Measures to Process-Product Factor Scores

		Minnesota Multiphasic Personality Inventory						Years Exper. in Educ.	Sem. Hours in Educ.	NTE Score
Process-Product Factor Score		Si	A	R	ES	Ho	PV			
Creativity Growth vs Pupil Physical Freedom	1	.22	.26	-.02	-.21	.25	.39**	-.01	-.02	-.15
Inquiry and Student Talk vs Drill and Teacher Talk	2	.14	.18	.07	-.24	.05	.25	-.00	-.05	-.02
Drill vs Extended Teacher Talk	3	-.24	-.08	-.25	.16	-.01	.01	-.13	-.28*	.01
Indirect Teaching vs Dependence-Proneness	4	.25	.04	.20	-.11	-.09	-.08	.10	.26	.05
Drill vs Disorder	5	-.02	.12	-.10	-.12	.08	.14	.13	.12	-.24
Conceptual and Supportive	6	-.09	.16	-.11	-.14	.05	.17	.06	.26	.15
Interest and Learning vs Pupil Hostility	7	-.01	.06	-.09	-.14	-.04	.20	.10	.29*	.12
Pupil Initiation vs Drill	8	-.15	-.16	-.02	.22	-.08	-.20	-.30*	-.07	.42**
Pupil Independent Work	9	.03	.11	.08	-.16	.00	.22	.01	.20	.08
Group Skill vs L	10	.19	.05	-.01	-.11	.09	.18	.02	.04	.07
Achievement Gain	11	.12	.22	-.07	-.24	.10	.26	.11	.17	.05
Unnamed	12	.14	.22	-.08	-.10	.29*	.25	-.22	-.19	-.04

*$p < .05$
**$p < .01$

the most reasonable conclusion to draw appears to be that this is a table of chance relationships.

Relation of Presage Measures to Classroom Product Means.

Although the relations of presage measures to product measures are difficult to interpret, as was indicated in the procedural rationale in Chapter 3, the possibility appeared to exist that there might be aspects of teacher personality which would be related to pupil products, yet which were expressed in classroom process in ways which were not recorded in the measures of classroom process. Conceivably they might be too subtle, or expressed in ways which were not anticipated in the development of the observation schedules. To the extent that this occurred, need for further development of observation procedures would be indicated. As has been pointed out earlier, measures of gain, as used here, should not be expected to relate as highly to anything as measures of status do.

The results of this analysis are shown in Table 67. Since there are 247 correlation coefficients in the table, 12-1/2 would be expected at the five per cent level by chance, and 2-1/2 at the one per cent level. In contrast, there were seventeen relationships at the five per cent level, which included seven which were significant at the one per cent level. For the most part, the relationships appear to be reasonable. It is perhaps not surprising that the largest number of significant relationships (6) are for Halo, the pupil's liking for the teacher. It appears that pupils dislike teachers who are overly concerned about their own health (Hs), anxious or depressed (D and A), overly concerned about details (pt), or introverted (Si), and it seems reasonable for them to like teachers who are skillful in working with others (Es).

Table 67

Relation of Teacher Presage Measures to Classroom Means

Classroom Means		Minnesota Multiphasic Personality Inventory									
		K	Hs	D	Hy	Pd	Mf	Pa	Pt	Sc	Ma
Iowa Tests of Basic Skills											
Vocabulary	1	.06	.20	.05	.17	-.01	-.01	.12	.10	-.03	.21
Reading	2	-.26	.14	-.01	.08	-.13	-.10	.13	.08	-.05	.13
Arithmetic Concepts	3	.02	.16	.19	.11	.10	-.17	.22	.20	.18	.29*
Arithmetic Problems	4	-.12	.26	.11	.25	.00	-.20	.28*	.06	-.03	.18
CMAS											
Anxiety	5	-.01	-.22	.06	-.18	.19	-.16	-.15	.07	-.05	-.08
L	6	.02	-.09	-.16	.03	.16	-.01	.19	.12	.14	.13
Dependence-Proneness	7	-.24	-.03	-.08	-.09	-.25	.12	-.04	-.17	-.11	-.00
Minn. Tests of Creativity											
Non-Verbal	8	-.15	-.04	.03	-.10	.02	-.22	-.19	.05	-.19	.03
Product Improvement	9	-.12	-.16	.12	-.22	-.14	-.00	-.22	-.04	-.21	-.36**
Unusual Uses	10	-.30*	.20	.16	.17	-.11	-.14	.24	.21	.12	.14
Pupil Survey	11	-.02	-.06	-.10	.02	-.18	-.06	.08	-.02	-.17	.21
My Class											
Halo	12	.07	-.27*	-.44**	-.09	-.11	-.10	-.14	-.39**	-.23	.10
Disorder	13	.24	.11	.21	-.04	.11	-.02	-.10	.19	.16	-.16

$*p < .05$
$**p < .01$

Table 67 (Continued)

Relation of Teacher Presage Measures to Classroom Means

Classroom Means		Minnesota Multiphasic Personality Inventory						Years Exper. in Educ.	Sem. Hours in Educ.	NTE Score
		Si	A	R	ES	Ho	PV			
Iowa Test of Basic Skills										
Vocabulary	1	-.04	.03	-.02	-.09	-.05	.09	.08	.32*	.21
Reading	2	.18	.17	-.08	-.19	.13	.19	.12	.11	-.02
Arithmetic Concepts	3	.04	.18	-.08	-.16	-.03	.09	-.11	.24	.32*
Arithmetic Problems	4	.14	.13	-.05	-.25	.08	.16	.36**	.13	-.13
CMAS										
Anxiety	5	.17	.09	.04	.08	.15	-.04	-.21	-.18	.12
L	6	-.12	.06	-.04	.02	.02	-.08	-.06	-.14	-.17
Dependence-Proneness	7	-.06	.08	-.18	-.03	.17	.15	.05	-.25	-.14
Minn. Tests of Creativity										
Non-Verbal	8	.11	.05	.04	.00	-.21	.22	-.04	-.10	-.08
Product Improvement	9	.18	.06	.09	-.05	.06	.22	.05	-.08	-.09
Unusual Uses	10	.20	.35**	-.22	-.36**	.25	.45**	.08	.07	-.09
Pupil Survey	11	-.11	.06	-.01	-.03	-.06	.04	-.27*	-.02	.12
My Class										
Halo	12	-.34*	-.31*	-.11	.28*	-.10	-.13	-.10	-.16	.09
Disorder	13	.20	-.15	.26	.03	-.17	-.25	-.04	.10	.17

*$p < .05$

**$p < .01$

The Unusual Uses measure had the next highest number of significant relationships (4), of which three were at the one per cent level. Most of the relationships fit theoretical expectations if the assumption which was suggested earlier is made that this measure, as administered, probably reflected compliant acceptance of authority to a considerable degree. The results indicate that growth in Unusual Uses was associated with teacher anxiety (A), a rigidly moralistic view of behavior (Pv), and negatively with skill in working with groups (Es). The finding that Unusual Uses growth related negatively to teacher test taking attitude or defensiveness (K) does not square with this interpretation, however. Some of the relationships obtained are inevitably chance ones -- perhaps this is one of them.

Ten of the seventeen relationships involved Halo or Unusual Uses; five other measures accounted for the other seven.

Arithmetic Concepts growth was related to teacher energy level (Ma), and to NTE score. There were suggestions in a paper based on different data (Fowler and Soar, 1963) that Ma was related to a style of teaching which shared responsibility with pupils, and other results from this project have agreed with theory in indicating that this kind of classroom promoted more abstract kinds of growth. Perhaps the relation with NTE score indicates that higher levels of teacher intellectual ability were associated with greater understanding and skill in teaching abstract quantitative material.

Pupil growth in Arithmetic Problems was associated with Pa score which may, for the moderate levels involved in these subjects, reflect sensitivity to feedback. Years of experience in teaching also related to this kind of growth. The perception is fairly commonly held that more experienced teachers often supervise pupil learning more closely and directly. There were suggestions in the analyses of variance of Climate, Control, and Grade Level that higher levels of tension or control were optimal for growth in Reading or Problems than for Vocabulary or Concepts. If the commonly held perception was true for these teachers, the result for years of experience would be reasonable.

Vocabulary was associated with semester hours in education. Perhaps greater exposure to education courses either increases technical skill in teaching or promotes a philosophy which values pupil freedom and independence in the classroom, or both. Classrooms reflective of the latter philosophy were shown to promote more Vocabulary growth in the analyses of variance of Climate, Control, and Grade Level.

Product Improvement growth was negatively associated with teacher energy level (Ma), which does not appear to agree with the interpretation of Ma which was made for Arithmetic Concepts. Perhaps an alternative is that the active enthusiasm of the high Ma teacher facilitates growth, except for the most extremely self-directed, independent sorts of growth, of which creativity may be the most extreme. Or alternatively, this may be one of the chance relationships which should be expected, even though it is significant beyond the one per cent level.

Pupil Survey, the pupil's report of work he has done in relation to classwork during the year, but which was not assigned by the teacher, was negatively related to years of teacher experience. It seems reasonable that the same interpretation of experience made earlier, that of close supervision of pupils, may be relevant here. It would not be surprising if this mode of teacher leadership resulted in less independent work by pupils.

Summary Discussion of Presage Measure Results.

Although the process-product factor scores had been expected to be the most useful measures against which to validate presage measures, the results did not follow expectations. Rather, the number of significant relationships found was the number which would be expected by chance, and the results were assumed to represent no more than chance. It seems possible that the process-product factor scores, rather than providing a more than usually adequate set of criterion measures, may have obscured results instead. The factors tended to be more clearly process factors or product factors, with only limited crossover.

In contrast, the results for classroom means produced seventeen significant relationships, in comparison to the 12-1/2 which would be expected, and the patterns of results appeared to be reasonable in most cases. Halo and Unusual Uses were the product measures which related most often to the presage measures.

These results also appear to suggest at least as great validity for the MMPI as for the commonly used indicators of teacher effectiveness, when pupil change is taken as the criterion against which empirical validity is examined.

Evaluation of Sensitivity Training

The summer between the two years of data collection, a sensitivity training laboratory was held for a subgroup of the teachers. The results of the laboratory were evaluated in terms of change in process-product factor scores for the teachers the second year. The factors which were chosen for study were selected on two bases: one, those which involved both process and product measures, and two, to sample product measures which involved subject matter achievement, creativity, and pupil personality and attitude.

These measures were studied by analysis of variance in relation to teacher personality measures obtained before the sensitivity training, since earlier work had indicated that personality was a significant variable in the effect of the training. It was anticipated that the effect of personality on training would appear as a significant interaction effect when teachers were blocked on level of personality score and training effects tested. The personality measures chosen on the basis of their interaction with training in previous research were MMPI Pd, Sc, R, and Pt. This anticipated interaction was found in three of the analyses, while in a fourth, the main effect for personality was significant.

Results of the Analyses.

Factor 1, Creativity Growth vs. Pupil Physical Freedom. The results of the analysis of the effect of the four teacher personality measures and the training experience for this factor are presented in Tables 68 through 71. Two of the analyses produced significant results. The analysis for R (Table 70) resulted in the significant interaction which replicated earlier findings. The low R trained group performed better than any of the other groups, although individual comparisons were not carried out to assure that significant differences occurred within the

Table 68

Analysis of Variance for Teacher Residual Change in Factor 1, Creativity Growth vs Pupil Physical Freedom, in Relation to MMPI Pd

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	3.14	----
Personality	2	7.25	----
Interaction	2	11.65	----
Error	39	11.70	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Pd	High	3	48.00	15	49.87	18	49.56
	Middle	5	51.40	5	49.60	10	50.50
	Low	6	48.33	11	50.09	17	49.47
	Total	14	49.36	31	49.90	45	49.73

*Each mean contains a constant of 50.

Table 69

Analysis of Variance for Teacher Residual Change in Factor 1, Creativity Growth vs Pupil Physical Freedom, in Relation to MMPI Sc

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	2.47	----
Personality	2	0.74	----
Interaction	2	9.28	----
Error	39	11.83	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Sc	High	4	48.50	12	51.00	16	50.38
	Middle	5	49.40	11	49.18	16	49.25
	Low	5	50.00	8	49.25	13	49.54
	Total	14	49.36	31	49.90	45	49.73

*Each mean contains a constant of 50.

Table 70

Analysis of Variance for Teacher Residual Change in Factor 1, Creativity Growth vs Pupil Physical Freedom, in Relation to MMPI R

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	5.73	----
Personality	2	2.52	----
Interaction	2	54.94	5.67**
Error	39	9.69	
Total	44		

**p <.01

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI R	High	4	49.00	6	50.50	10	49.90
	Middle	6	47.83	22	50.36	28	49.82
	Low	4	52.00	3	45.33	7	49.14
	Total	14	49.36	31	49.90	45	49.73

*Each mean contains a constant of 50.

Table 71

Analysis of Variance for Teacher Residual Change in Factor 1, Creativity Growth vs Pupil Physical Freedom, in Relation to MMPI Pt

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	8.71	1.02
Personality	2	58.85	6.91**
Interaction	2	10.81	1.27
Error	39	8.52	
Total	44		

**p <.01

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Pt	High	4	47.50	13	50.38	17	49.70
	Middle	5	48.40	11	47.64	16	47.88
	Low	5	51.80	7	52.57	12	52.25
	Total	14	49.36	31	49.90	45	49.73

*Each mean contains a constant of 50.

trained group. Indeed, it seems probable that the major contribution to the significant interaction was made by the low R untrained group. The mean performance of the trained group, as a whole did not differ from the untrained group.

The analysis for Pt (Table 71) produced a significant main effect for personality, with the apparent best performance for low Pt as would be anticipated.

Factor 4, Indirect Teaching vs. Dependence-Proneness. The results of the analysis are presented in Tables 72 through 75. The significant interaction which was expected appeared for the analysis of Sc shown in Table 73. The pattern of the results within the trained teachers is for low Sc teachers to perform best, and high Sc teachers to perform least well, which was the direction anticipated. The obtained difference was in favor of the trained group, but it was not significant. The anticipated pattern for the interactions was obtained for R and for Pt, (Tables 74 and 75), but was not significant.

Factor 7, Interest and Learning vs. Pupil Hostility. The results for Factor 7 are shown in Tables 76 through 79. The predicted interaction between R and the sensitivity training appeared for this factor (Table 78), and the pattern appeared as well though not significant for Pt (Table 79), and for Sc (Table 77), although less clearly.

Factor 11, Achievement Gain. The results for Factor 11 are shown in Tables 80 through 83. Although none of the results of the analyses were significant, the expected pattern of interaction in which low scoring teachers on each of the personality scales performed better than high scoring teachers following the training tended to emerge with varying

Table 72

Analysis of Variance for Teacher Residual Change in Factor 4, Indirect Teaching vs Dependence-Proneness, in Relation to MMPI Pd

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	6.45	----
Personality	2	5.87	----
Interaction	2	15.30	----
Error	39	16.80	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Pd	High	3	51.00	15	49.13	18	49.44
	Middle	5	50.20	5	52.00	10	51.10
	Low	6	51.00	11	48.45	17	49.35
	Total	14	50.71	31	49.35	45	49.78

*Each mean contains a constant of 50.

Table 73

Analysis of Variance for Teacher Residual Change in Factor 4, Indirect Teaching vs Dependence-Proneness, in Relation to MMPI Sc

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	21.73	1.46
Personality	2	0.74	----
Interaction	2	53.20	3.57*
Error	39	14.90	
Total	44		

*$p < .05$

Residual Gain Means**

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Sc	High	4	48.75	12	50.58	16	50.12
	Middle	5	50.20	11	50.00	16	50.06
	Low	5	52.80	8	46.62	13	49.00
	Total	14	50.71	31	49.35	45	49.78

**Each mean contains a constant of 50.

Table 74

Analysis of Variance for Teacher Residual Change in Factor 4, Indirect Teaching vs Dependence-Proneness, in Relation to MMPI R

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	16.20	----
Personality	2	2.03	----
Interaction	2	4.79	----
Error	39	17.63	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI R	High	4	50.00	6	49.67	10	49.80
	Middle	6	50.17	22	49.32	28	49.50
	Low	4	52.25	3	49.00	7	50.85
	Total	14	50.71	31	49.35	45	49.78

*Each mean contains a constant of 50.

Table 75

Analysis of Variance for Teacher Residual Change in Factor 4, Indirect Teaching vs Dependence-Proneness, in Relation to MMPI Pt

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	12.02	----
Personality	2	30.64	1.88
Interaction	2	6.22	----
Error	39	16.32	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Pt	High	4	48.00	13	48.46	17	48.35
	Middle	5	52.00	11	50.45	16	50.93
	Low	5	51.60	7	49.29	12	50.25
	Total	14	50.71	31	49.35	45	49.78

*Each mean contains a constant of 50.

Table 76

Analysis of Variance for Teacher Residual Change in Factor 7, Interest and Learning vs Pupil Hostility, in Relation to MMPI Pd

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	0.47	----
Personality	2	6.71	----
Interaction	2	7.40	----
Error	39	15.80	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Pd	High	3	50.00	15	48.33	18	48.61
	Middle	5	50.00	5	51.60	10	50.80
	Low	6	49.50	11	50.27	17	50.00
	Total	14	49.79	31	49.54	45	49.62

*Each mean contains a constant of 50.

Table 77

Analysis of Variance for Teacher Residual Change in Factor 7, Interest and Learning vs Pupil Hostility, in Relation to MMPI Sc

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	1.37	----
Personality	2	1.51	----
Interaction	2	2.00	----
Error	39	15.23	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Sc	High	4	49.00	12	49.33	16	49.24
	Middle	5	48.60	11	51.00	16	50.25
	Low	5	51.60	8	47.88	13	49.31
	Total	14	49.79	31	49.54	45	49.62

*Each mean contains a constant of 50.

Table 78

Analysis of Variance for Teacher Residual Change in Factor 7, Interest and Learning vs Pupil Hostility, in Relation to MMPI R

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	17.10	1.32
Personality	2	9.68	----
Interaction	2	73.74	5.69**
Error	39	12.94	
Total	44		

**p<.01

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI R	High	4	47.75	6	51.33	10	49.90
	Middle	6	49.67	22	49.86	28	48.82
	Low	4	52.00	3	43.67	7	48.43
	Total	14	49.79	31	49.54	45	49.62

*Each mean contains a constant of 50.

Table 79

Analysis of Variance for Teacher Residual Change in Factor 7, Interest and Learning vs Pupil Hostility, in Relation to MMPI Pt

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	0.31	----
Personality	2	42.11	3.01
Interaction	2	6.34	----
Error	39	14.00	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Pt	High	4	49.00	13	49.54	17	49.41
	Middle	5	49.00	11	47.64	16	48.06
	Low	5	51.20	7	52.57	12	52.00
	Total	14	49.79	31	49.54	45	49.62

*Each mean contains a constant of 50.

Table 80

Analysis of Variance for Teacher Residual Change in Factor 11, Achievement Gain, in Relation to MMPI Pd

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	1.61	----
Personality	2	14.22	----
Interaction	2	6.92	----
Error	39	19.05	
Total			

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Pd	High	3	51.00	15	49.73	18	49.94
	Middle	5	48.60	5	50.00	10	49.30
	Low	6	52.17	11	50.73	17	51.24
	Total	14	50.64	31	50.13	45	50.29

*Each mean contains a constant of 50.

Table 81

Analysis of Variance for Teacher Residual Change in Factor 11, Achievement Gain, in Relation to MMPI Sc

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	1.63	----
Personality	2	5.48	----
Interaction	2	1.03	----
Error	39	19.69	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Sc	High	4	50.75	12	50.00	16	50.19
	Middle	5	50.20	11	49.45	16	49.68
	Low	5	51.00	8	51.25	13	51.15
	Total	14	50.64	31	50.13	45	50.29

*Each mean contains a constant of 50.

Table 82

Analysis of Variance for Teacher Residual Change in Factor 11, Achievement Gain, in Relation to MMPI R

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	18.65	----
Personality	2	10.94	----
Interaction	2	3.20	----
Error	39	19.45	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI R	High	4	48.75	6	49.33	10	49.10
	Middle	6	51.33	22	50.41	28	50.61
	Low	4	51.50	3	49.67	7	50.72
	Total	14	50.64	31	50.13	45	50.29

*Each mean contains a constant of 50.

Table 83

Analysis of Variance for Teacher Residual Change in Factor 11, Achievement Gain, in Relation to MMPI Pt

Analysis of Variance

Source of Variation	df	Mean Squares	F
Treatment	1	1.02	----
Personality	2	6.41	----
Interaction	2	3.64	----
Error	39	19.69	
Total	44		

Residual Gain Means*

		Trained		Untrained		Total	
		N	Mean	N	Mean	N	Mean
MMPI Pt	High	4	49.25	13	50.08	17	49.88
	Middle	5	51.00	11	49.73	16	50.13
	Low	5	51.40	7	50.86	12	51.08
	Total	14	50.64	31	50.13	45	50.29

*Each mean contains a constant of 50.

degrees of clarity.

Summary Discussion of Sensitivity Training Results.

The results which were found in earlier research (Bowers and Soar, 1961) indicated that there was not an over-all increase in teaching skill for teachers who had participated in a sensitivity training laboratory, but that subgroups whose psychic resources were high as indicated by several scales of the MMPI made clear gains, and subgroups whose resources were low as indicated by the same scales tended to lose. The training in the present study was planned on the rationale that more supportive school environments, along with sensitivity training for the principals of the schools as well as the teachers, might eliminate the tendency for subgroups of the teachers to move in the wrong direction in response to the training. This question is not answered as clearly as had been hoped, since for some factors the teacher group with lower resources tended to teach somewhat less well, whereas for other factors, the gain for the trained group appeared to be the clearer result.

On the other hand, the interaction which was expected as a replication of the earlier findings was significant in three of the analyses, and the pattern appeared in numbers more. While significant results from this number of analyses is not as clear-cut a result as might be hoped, the personality measures which produced them were not selected on the basis of the present data so that the finding of the results a second time is at least a limited replication of earlier findings.

Other possible reasons for the results not being clear-cut may be the small number of teachers in the trained group (14), and the fact that the influence of the training of the principals was extended to the untrained group as well as the trained group. Additionally, the effect of a training experience would be expected to vary from group to group as a consequence of differences in groups, training staff, and the interaction of the two.

Perhaps the major difference in the procedure of this study and the earlier one is that this study used as its measures of change factors which were joint measures of classroom process and pupil products, whereas the earlier study used three measures of process, and one of product but these were analyzed separately. If the possibility raised in the section on presage measures is taken seriously -- that the joint measures of process and product may be less clear than either kind of measure separately -- then these analyses have labored at a disadvantage.

Although questions of why the results of the evaluation of sensitivity training may not have been more clear-cut are important, the results from these analyses do replicate earlier findings, even though not as clearly as might be wished. On the other hand, there is no contamination in the results as a consequence of the personality measures having been selected from examination of the data. Indeed, these measures were selected and teachers sorted into subgroups for analysis before the residual change scores for the process-product factor scores had been completed. When this is considered, perhaps these results should be taken as replicating the earlier findings. Certainly, each supports the other.

The implications of the earlier study appear to stand as well -- not everyone is likely to be benefited by sensitivity training, at least within a one year period following the experience, and the people who will benefit can be identified by a simple, inexpensive, objective measurement device. This is a finding whose social importance is considerable for education in particular, and as well, for the diverse other fields in which sensitivity training is being employed increasingly frequently.

Chapter 5

Summary, Conclusions, and Implications

The Problem

This project stems from the view that the varied goals of education are compatible. They range from the traditional goals of subject-matter achievement to the broadly conceived concern for the development of the potential of the individual in all its varied aspects -- intellectual, personal, social and emotional. The specifications of classroom process that are required to foster growth in these areas have many more aspects in common than aspects that are unique.

It was hypothesized that a constellation or core of classroom process could be identified which could be related to pupil growth in these varied areas, but it was expected that pupil personality would interact with it in determining growth. It was further hypothesized that a constellation of classroom process and related pupil change could be identified which would be a meaningful way of relating classroom outcomes to presage characteristics of the teachers.

The sorts of relationships between teachers and pupils in the classroom which theory identifies as important to pupil growth appear to be those which sensitivity training is believed to foster. Accordingly, it was finally hypothesized that sensitivity training for the teachers should result in changes in the teachers which could be meaningfully assessed by changes in these constellations of classroom process and pupil outcome.

Outline of the Project

Design.

In general, the design of the project was a fall and spring testing of a variety of pupil characteristics in grades three through six, with observation of the classroom during the year. The following summer there was a sensitivity training laboratory for a subgroup of the teachers, with observation of the classrooms the following year, and spring testing of the pupils again.

In more detail, the sequence was: at the beginning of the school year data collection was begun with the administration of achievement, personality, and creativity tests to all of the pupils in four schools, and a test of group problem solving skills was administered to each classroom. At about this same time, teachers of the various classrooms were given a personality test to complete on their own and return. During the middle portion of the year, classroom observations were carried out using two observation schedules. Then, toward the end of the school year, all of the tests administered to pupils at the beginning of the year were repeated, and in addition, the measures of attitude toward the teacher and the school were administered, as well as the pupil's report of outside work.

The following summer a sensitivity training laboratory was conducted for a subgroup of the teachers, and the principals from the schools attended another laboratory administered by the National Training Laboratories.

During the second year of the project, the same observation schedule was followed, and the same spring testing program was administered. In addition, in three of the four schools in the project, the school system itself administered the same achievement tests at the beginning of the sixth grade year, so that an additional set of achievement test measures was available for those pupils.

Subjects.

The subjects in the study consisted of the teachers and pupils in fifty-six classrooms, grades three through six, in four elementary schools from two systems in a metropolitan area of central South Carolina. Informal observation suggested that most of the span of socio-economic levels was involved, but probably the upper-middle was more heavily represented. It was the reaction of visitors to the project from other cities that these were unusually "good" schools, and data from the project supported this view.

Analysis of the Data.

Analysis of the data involved five major phases, with a number of steps in each.

1. The product data were processed by calculating residual true gain scores in which the effects of regression and of initial standing were eliminated.

2. The process data were factor analyzed twice to identify successively smaller numbers of measures and to calculate factor scores descriptive of classroom process.

3. The relations between process and product measures were studied by correlating process factor scores with classroom means for the product measures, by analysis of variance, and by factor analyzing both sets of measures together.

4. The concurrent validity of the presage measures was studied by relating them to measures of teacher effectiveness defined by factor scores from the process-product factor analysis.

5. The experimental training experience offered a subgroup of the teachers was evaluated by analysis of variance of change in the latter factor scores for the two years of the project.

Results and Discussion

Product Data.

The measurements of the pupils for the various periods indicated that as a whole they were an advanced group -- ranging from several months to a full grade level on some measures. The expected low negative correlation of anxiety with achievement was found, as was a low positive correlation between creativity and achievement -- varying from subtest to subtest.

Process Data.

In the course of reducing the number of process measures and converting them to factor scores, stability coefficients expressing the correlation between years for each of the factors became available. While the exact meaning of these results was not clear, it was clear that the consistency of classroom process of a given teacher varied from zero to moderately high levels, depending on the nature of the process. The most stable was Teacher Criticism, which correlated .60 from one year to the other.

Relations Between Process and Product Measures.

The relations between process and product measures were studied in a number of ways -- by analysis of variance, by correlation analysis, and by factor analysis. They were also studied for different periods of time --

the first academic year, the intervening summer, the second academic year, and over the two years of the project.

Analysis of Climate and Control. Following small group research identifying two dimensions of group effectiveness, factors were selected from the process analysis which represented the emotional climate of the classroom (Climate), and the sharing of responsibility within the group (Control). Four classrooms representing combinations of the four extremes of these dimensions were identified at each grade level, three through six.

When these data were analyzed in a 2x2x4 analysis of variance, for Vocabulary, Reading, and the three creativity measures, interactions with grade level were found frequently. The growth curves often changed direction at the fourth grade, although the direction of the change varied from measure to measure. Indirect teaching increased Vocabulary growth significantly and lessened the inhibitory effect of the fourth grade for both Vocabulary and Unusual Uses. On the other hand, it appeared that Reading grew most rapidly under combinations of classroom process involving an optimal and a non-optimal condition.

The results for Reading were unexpected and were interpreted in terms of an interaction between abstractness of the learning involved, and the degree of tension induced in the pupils.

Summer Gain. When the same classroom process factors were studied in relation to growth during the summer for entering sixth graders, Vocabulary reflected the same influences as for the school year, with nearly a two-fold increase in growth for the optimal conditions. Concepts showed a somewhat similar pattern, and Reading was similar to the school year pattern, although the results were less significant. In general, the same conditions which produced most growth during the year also produced the most growth the following summer, but the optimal conditions differed from subject matter to subject matter.

A considerable number of pupils actually grew more during the summer than they had the previous year, and although this conclusion was qualified in several ways, the question was examined of whether there might be individual "styles of learning" by which some pupils tended to grow more during the summer consistently, while other pupils did more of their growing in school. Significant evidence for this effect was found.

Correlation of Factor Scores with Class Means. When the classroom process for each classroom was described by nine factor scores obtained from the factor analysis, and these factor scores were correlated with mean change for the pupils in the classrooms, three factors were found to relate to pupil achievement. Two of these described expression of hostility in the classroom -- one by the teacher, one by the pupils -- and both related negatively to learning. The factor associated with achievement gain was one which apparently represented teacher direction of the learning process through brief periods of teacher lecture followed by pupil response. The relative amount of teacher talk vs. pupil talk did not relate to pupil change, nor did an indirect teaching factor relate to achievement growth, but only to growth in creativity. The indirect teaching factor identified by this factor analysis differed in nature from the measure used as a basis for classification in the previous two analyses. In addition, the data were examined to see whether the difference between these findings and others reporting relations between indirect teaching and achievement gain might be explained by the level of indirect teaching in these classrooms. It was found that the average teacher in this project was as indirect and as non-hostile as the teachers selected as indirect teachers in the Flanders data. The question was raised as to whether the positive association of achievement gain with indirect teaching might disappear at the upper levels of indirectness.

When the same factor scores were correlated with classroom means for subgroups selected on the basis of sex, anxiety, L, and Dependence-Proneness, some of the expected differences for the anxiety subgroups were found. For example, for low-anxious pupils increasing indirectness was correlated moderately highly with growth in Product Improvement, but this relationship became smaller for total class groups, and still smaller for high anxious pupils. These results, in conjunction with others, suggest that low-anxious pupils were best able to "make use of" indirect teaching, but that high-anxious pupils were unable to make effective use of the less structured situation. A question in interpreting these results and others dealing with indirect teaching is whether varying degrees of structure may exist for the same level of indirectness as indicated by these measures. Perhaps indirectness may tend either toward democratic leadership or laissez-faire leadership in the Lewinian sense of these terms. Or, perhaps this question is only relevant for relatively highly indirect classrooms.

There were no clear differences by sex, and the results for Dependence-proneness and for L were frequently not clear.

Study of Gain Over Two Years. The four factors from the analysis of classroom process which had related most clearly to pupil change were used to study gain over two years for measures representing achievement, personality, and creativity. The two factors which primarily reflected expression of hostility in the classroom showed their major effects for the current year, and the effect of the previous year largely "washed out." The two factors which more nearly reflected teacher control and "teaching" behavior showed their major effects for the previous year, and were only occasionally significant for the current year. Probably these results reflect partly the indirect, low hostile classrooms which were involved in the study. Given this qualification, perhaps what is represented is that last year's hostility no longer matters very much, and pupil growth evens out, while indirect teaching initiates a growth process which required more than a year to become significant.

An additional finding from these analyses was that the intermediate level of teacher control behavior very often resulted in the most pupil growth, although the difference was not always significant. This finding further supports the previous interpretation of a curvilinear relationship between indirect teaching and pupil growth at the higher levels of indirectness.

Presage Measures.

The measures of classroom process and pupil products were factor analyzed together in order to produce dimensions of teacher effectiveness which represented both. When these factor scores were related to measures of teacher characteristics which included the Minnesota Multiphasic Personality Inventory, years of experience in teaching, amount of preparation, and National Teacher Examination score, the resultant correlation matrix appeared to be a chance one. When the same presage measures were related to classroom means for pupil change, a large enough number of significant relationships were obtained to suggest that the results were meaningful. Halo and Unusual Uses were the pupil measures most often involved, and the relationships seemed to be reasonable.

It appeared that the MMPI was as valid a predictor of classroom outcome as the three commonly used measures of teacher characteristics. The NTE, for example, only related to pupil growth in Arithmetic Concepts.

It was anticipated that the process-product factor scores should relate most clearly to teacher presage measures since they encompassed broader spectra of data. Perhaps this expectation failed because the factors tended still to be primarily process or product, with relatively little crossing over, and it may be that what crossing over there was tended to muddy relationships. Parenthetically, the clearest product factor in this analysis was one of achievement gain, but it correlated .09 from one year to the next for the same teacher. Perhaps the failure of the other factors to relate should not be so surprising in comparison to this one which was surely one of the more objective.

Evaluation of Sensitivity Training.

Previous research and clinical observation of groups suggest that not every one is benefited by sensitivity training. A replication of the previous research was carried out here using four factors from the process-product analysis as criterion measures, and personality level on four MMPI measures as blocking measures. The resulting 2x3 analysis of variance showed the anticipated significant interaction in three of sixteen analyses, and the pattern appeared in numbers of others. Although these results offer only limited support for the previous research, the two strengthen each other.

Implications

A number of implications appear to follow from these results. It is clear that the emotional climate of the classroom is an important consideration for the growth of pupils even in classrooms which are generally supportive. If the deleterious effects of hostility expression emerged clearly even in such a supportive atmosphere, surely the negative effects must be more serious in many schools and no other effect was more clear-cut.

The results for indirectness of teaching were not as clear-cut in all cases as in previous studies and suggest the possibility that the shape of the relationship between this aspect of teaching style and pupil growth may vary with the level of indirectness. Perhaps we have reached the point in studying the relations between classroom process and pupil change at which it will be increasingly important to study the shape of such relationships over wide ranges of the phenomena, rather than looking simply for the existence of the relationship.

There were suggestions in the data as well that the nature of the change studied in pupils interacts with the classroom process intended to facilitate it. While it is true, generally, that the kinds of classroom process which facilitate desirable change in pupils are compatible, in some detail they appear not to be. Specifically, a different level of teacher control of the classroom appears to be optimal for growth in

Reading and Arithmetic Problems than is optimal for Vocabulary and Arithmetic Concepts, and a still more extreme level is optimal for growth in creativity. But probably these findings are another consequence of the unusually "good" classrooms in which the data were collected. The probability seems high that in other classrooms these results would not have differed.

The finding that pupils continued growth in subject matter during the summer following optimal kinds of classrooms the previous year appears to have far-reaching consequences. It argues that the effect of the classroom does indeed stretch beyond the confines of the room itself, and that the pay-off from an effective classroom is doubly important. The related finding of apparent differences in learning style by which some pupils grow more than others away from the direct influence of the classroom seems equally important. If validated, it would argue that extending school to 12 months of the year might even be harmful for this subgroup -- and apparently some pupils are already making use of the school 12 months of the year.

Although it is by no means clear, it may be that this latter result is related to the optimal level of classroom process discussed in the preceding paragraph. There was evidence in the analysis for subgroups by anxiety level that these subgroups differed in the optimal level of directness or indirectness of teacher control. This finding, along with the interaction of task and level of control, suggest a triple interaction in which not only is the optimal level of teacher control different from one task to another, but also from one pupil subgroup to another based on personality.

And all of these findings appear to argue for more extensive and refined analysis of the effects of interpersonal relationships in the classroom on the development of human potential.

All in all, there is support for educational and psychological theory running through much of these results, but the support is not great for relatively simple interpretations. Rather, different kinds of classroom behavior seem to produce some kinds of growth, but not others. It is important to note, however, that with only few exceptions, there are no classroom behaviors which promote one kind of learning at the sacrifice of another. Rather, they seem to be compatible.

These results suggest that teaching is so complex that no single aspect best supports the achievement of a wide variety of educational goals -- rather than a simple answer, we seem to need many. Perhaps what is indicated, at least at these grade levels, is a complex pattern of teaching made up, first of all, of avoidance of hostility and criticism, but with teacher direction of learning by brief explanation rather than extended lecture, and moderately indirect teaching with clear structure.

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APPENDIX A

Table 84

Means and Standard Deviations of Classroom Means by Sex for the First Project Year**

Measure	Boys Mean	Boys Standard Deviation	Girls Mean	Girls Standard Deviation
Residual True Gain Scores				
Iowa Tests of Basic Skills				
Vocabulary	57.1	01.87	57.2	01.91
Reading	55.2	02.90	55.9	02.77
Arithmetic Concepts	56.6	01.61	56.5	01.69
Arithmetic Problems	57.0	02.17	57.2	01.81
Arithmetic Total	56.8	01.84	56.8	01.64
Children's Manifest Anxiety Scale				
Anxiety	49.5	01.99	49.7	01.76
L	49.3	00.42	49.4	00.46
Dependence-Proneness	49.1	01.06	49.9	00.93
Minn Tests of Creativity				
Non-Verbal	53.1	01.38	53.5	01.41
Product Improvement	56.9	01.63	57.2	01.54
Unusual Uses	55.3	03.28	57.1	02.92
Russell Sage Social Relations Test *				
Activity	51.4	01.49	51.4	01.49
Total	49.9	07.75	49.9	07.75
Spring, 1963 Scores				
Pupil Survey	56.2	08.59	56.6	08.11
My Class				
Halo	05.8	00.87	06.1	01.09
Disorder	16.8	01.31	16.2	01.57
Climate	21.4	00.94	21.6	00.93

*Total Class

**N = 55

Table 85

Means and Standard Deviations of Classroom Means for Low and High Anxious Groups for the First Project Year**

	Low Anxious		High Anxious	
Measure	Mean	Standard Deviation	Mean	Standard Deviation
Residual True Gain Scores				
Iowa Tests of Basic Skills				
Vocabulary	57.4	01.77	57.0	01.92
Reading	55.7	02.63	55.7	02.84
Arithmetic Concepts	56.8	01.68	56.5	01.53
Arithmetic Problems	57.1	01.88	57.0	02.07
Arithmetic Total	56.9	01.77	56.8	01.70
Children's Manifest Anxiety Scale				
Anxiety	49.8	01.23	49.5	01.73
L	49.3	00.36	49.3	00.41
Dependence-Proneness	49.7	00.75	49.3	00.95
Minn Tests of Creativity				
Non-Verbal	53.1	01.51	53.4	01.29
Product Improvement	57.1	01.56	57.0	01.65
Unusual Uses	56.1	03.17	56.2	02.98
Russell Sage Social Relations Test *				
Activity	51.4	01.49	51.4	01.49
Total	49.9	07.75	49.9	07.75
Spring, 1963 Scores				
Pupil Survey	57.7	07.82	55.0	08.30
My Class				
Halo	06.1	00.88	05.8	00.88
Disorder	16.2	01.54	16.9	01.26
Climate	21.5	01.01	21.4	00.70

*Total Class
**N = 55

Table 86

Means and Standard Deviations of Classroom Means for Low and High L Groups for the First Project Year

Measure	Low L** Mean	Low L** Standard Deviation	High L*** Mean	High L*** Standard Deviation
Residual True Gain Scores				
Iowa Tests of Basic Skills				
Vocabulary	57.5	01.91	57.0	01.87
Reading	56.1	03.15	55.0	02.31
Arithmetic Concepts	57.0	01.63	56.3	01.54
Arithmetic Problems	57.3	02.29	56.8	01.87
Arithmetic Total	57.1	01.82	56.5	01.69
Children's Manifest Anxiety Scale				
Anxiety	49.4	01.61	49.8	01.73
L	49.4	00.40	49.3	00.47
Dependence-Proneness	49.4	01.07	49.5	00.89
Minn Tests of Creativity				
Non-Verbal	53.4	01.31	53.3	01.44
Product Improvement	57.2	01.91	57.1	01.54
Unusual Uses	56.7	03.07	55.9	02.88
Russell Sage Social Relations Test *				
Activity	51.4	01.50	51.4	01.49
Total	50.1	07.71	49.9	07.75
Spring, 1963 Scores				
Pupil Survey	55.5	07.85	57.5	07.97
My Class				
Halo	05.9	00.94	06.0	01.04
Disorder	16.7	01.34	16.4	01.57
Climate	21.4	00.95	21.5	01.03

*Total Class

**One teacher had no Low L pupils.

***N = 54

Table 87

Means and Standard Deviations of Classroom Means for Low and High Dependence Prone Groups for the First Project Year **

Measure	Low Dependence Prone Mean	Low Dependence Prone Standard Deviation	High Dependence Prone Mean	High Dependence Prone Standard Deviation
Residual True Gain Scores				
Iowa Tests of Basic Skills				
Vocabulary	56.6	01.91	57.8	01.78
Reading	55.0	02.90	56.2	02.91
Arithmetic Concepts	56.4	01.61	56.8	01.73
Arithmetic Problems	56.9	02.14	57.3	02.05
Arithmetic Total	56.7	01.79	57.1	01.91
Children's Manifest Anxiety Scale				
Anxiety	49.8	02.05	49.5	01.62
L	49.3	00.42	49.3	00.42
Dependence-Proneness	49.4	00.95	49.5	00.97
Minn Tests of Creativity				
Non-Verbal	53.2	01.33	53.3	01.38
Product Improvement	56.9	01.74	57.2	01.54
Unusual Uses	55.6	02.99	56.7	03.24
Russell Sage Social Relations Test *				
Activity	51.4	01.49	51.4	01.49
Total	49.9	07.75	49.9	07.75
Spring, 1963 Scores				
Pupil Survey	54.6	07.68	58.1	07.55
My Class				
Halo	05.7	01.04	06.1	00.93
Disorder	16.9	01.50	16.2	01.56
Climate	21.4	00.89	21.5	01.00

*Total Class
**N = 55

Table 88

Means and Standard Deviations for Classroom Process Factor Scores for the First Project Year*

Factor Scores		Mean	Standard Deviation
Teacher Criticism	1	53.1	07.17
Teacher vs. Pupil Talk	2	49.7	09.00
Disc. vs. Rapid Inter.	3	50.1	08.39
Pupil Freedom in Disc.	4	51.6	07.74
Unnamed	5	52.1	07.65
Pupil Host. vs. Pupil Int.	6	51.0	07.31
Pupil Physical Freedom	7	50.8	08.75
Indir. vs. Silence & Conf.	8	50.8	08.19
Unnamed	9	52.3	07.22

*N = 55

Table 89

Correlations Between Process Factor Scores for the First Project Year

Factor Scores		1	2	3	4	5	6	7	8	9
Teacher Criticism	1	--	-.054	-.075	.225	.263	.398	.204	-.303	-.296
Teacher vs. Pupil Talk	2		--	-.020	.076	.126	-.002	.201	.366	-.108
Disc. vs. Rapid Inter.	3			--	.264	.022	.016	.207	-.002	.031
Pupil Freedom in Disc.	4				--	.260	.245	.192	-.279	.063
Unnamed	5					--	.056	.124	-.226	.025
Pupil Host. vs. Pupil Int.	6						--	.458	-.364	-.104
Pupil Physical Freedom	7							--	-.216	-.144
Indir. vs. Silence & Conf.	8								--	-.124
Unnamed	9									--

Table 90

Correlations between 40 Classroom Observation Measures and 17 Classroom Means for Subject Matter, Personality, Creativity, Attitude and Group Skill

Measure		1	2	3	4	5	6	7	8	9
Grade	1	--								
SCOR										
Teach Encour Ans Fact	2	-.19	--							
T Enc Inter, General	3	.31	.28	--						
Pupil Int-Atten Rating	4	-.12	.14	.17	--					
Teach Verbal Hostility	5	-.29	-.03	-.24	-.33	--				
Pupil Verbal Hostility	6	.19	-.06	.17	-.30	.36	--			
Pupil Non-Verbal Host	7	-.01	-.10	-.14	-.54	.38	.61	--		
Teach Non-Verbal Affect	8	.00	.08	.34	.38	-.27	-.28	-.35	--	
Pupil Verbal Affection	9	.17	.14	.44	.23	-.04	.33	.06	-.02	--
Pupil Non-Verbal Affect	10	-.05	-.18	-.05	-.09	-.05	-.15	-.04	-.03	-.04
Teach Central	11	-.29	.43	.12	-.10	-.16	-.14	.03	.12	-.05
Free Movement	12	.08	-.13	-.09	-.33	.12	.38	.32	-.25	.22
Pupil Central	13	.15	.12	.20	.27	-.29	.12	-.01	.04	.41
Autonomous Soc Groups	14	.21	-.16	-.12	-.63	.20	.26	.39	-.36	-.09
Pupil as Individuals	15	.04	-.27	-.14	.02	.13	.12	.05	-.13	-.12
Total Auton Groups	16	.22	-.27	-.20	-.52	.08	.22	.28	-.34	-.04
Flander's Inter. Analysis										
Revised ID for 8 & 9	17	-.13	.03	.01	.35	-.39	-.33	-.27	.22	-.06
T Activ/S Activ	18	-.22	.13	.08	-.12	-.06	-.09	-.05	.16	-.10
Ext Accept P Idea	19	-.14	.03	-.13	-.03	-.11	-.24	-.15	.17	-.26
Extended Indirect	20	-.14	.03	-.02	.03	-.28	-.28	-.21	.40	-.26
T Elab Student Idea	21	-.30	.07	-.25	.15	-.13	-.34	-.24	.19	-.25
Extended Question	22	-.11	.29	.12	.25	-.12	-.23	-.17	.21	.07
Extended Lecture	23	.05	-.15	.12	-.17	-.10	.02	.06	.13	-.08
Extended Criticism	24	.09	-.05	-.05	-.23	.55	.31	.27	-.13	-.06
Vicious Circle	25	-.10	.21	.15	-.20	.24	-.03	-.03	.02	-.13
Tot Silence & Conf	26	.28	-.02	.17	-.22	.12	.30	.15	-.37	.32
S Talk fol T Talk	27	-.23	.06	-.25	-.00	.20	.07	.12	-.06	-.14
S Talk Prolonged	28	.28	-.06	.00	.11	-.02	.02	.02	-.11	.13
Sum of S Talk	29	.18	-.04	-.09	.16	.06	.04	.02	-.18	.06
Flexibility	30	.09	.03	.15	-.23	.14	.11	.09	-.10	.21

Table 90 (Continued)

Measure		1	2	3	4	5	6	7	8	9
Drill	31	-.23	.25	-.14	.20	-.05	-.06	-.01	-.01	-.08
Inquiry	32	.21	-.08	-.07	.11	-.03	-.06	-.01	-.07	-.06
Inquiry/Drill Ratio	33	.28	-.18	-.01	.00	-.03	-.02	.02	-.05	.00
Pupil Interrupts	34	.21	-.33	-.04	-.26	.15	.31	.12	-.19	.18
Broad Answer	35	.36	-.02	.19	.02	-.02	.23	.11	-.14	.48
Pupil Ini ff Ind	36	.20	-.34	-.04	-.21	.15	.29	.10	-.14	.19
Pupil Ini ff Dir	37	.18	-.05	.11	.01	.01	.23	.04	-.08	.19
Pupil Ini ff T Crit	38	.16	-.15	-.23	-.26	.40	.09	.07	-.15	-.13
Revised Disorder	39	-.06	.21	.17	-.24	.22	-.00	-.03	.04	-.11
Lecture Length	40	.10	-.06	.13	-.11	-.11	-.02	.04	.14	-.13
Class Means										
Vocabulary	41	.24	-.05	.15	.23	-.22	-.20	-.24	.22	.14
Reading	42	-.02	.08	.06	.11	.00	-.09	.01	-.02	.13
Arith Concepts	43	.55	-.11	.33	.25	-.36	-.12	-.28	.19	.20
Arith Problems	44	.01	-.07	.13	.24	-.24	-.18	-.22	.18	.11
Arith Total	45	.27	-.10	.22	.24	-.28	-.15	-.30	.18	.14
Anxiety	46	-.20	-.14	-.05	.02	-.18	-.11	.12	-.09	-.24
L	47	.16	.01	-.02	-.40	.11	.41	.30	-.25	-.03
Dependency	48	-.38	-.06	-.25	.02	.35	.11	.10	-.12	.01
Creat Non-Verbal	49	-.35	.01	-.12	.20	.06	-.26	.07	.09	-.15
Creat Prod Improv	50	-.62	.26	-.06	.32	-.01	-.15	-.11	.32	-.12
Creat Unusual Use	51	.18	.09	.18	.32	-.22	.03	-.08	.17	.14
Pupil Survey	52	.15	.01	.04	.17	-.10	.04	.01	.30	.08
My Class Halo	53	-.35	-.02	.01	.09	.23	.09	-.01	.03	.05
Disorder	54	.11	-.06	-.05	-.22	.02	.02	.12	-.04	-.30
Climate	55	-.10	.09	.04	.17	-.12	.03	.12	.02	-.08
RSSR Total	56	-.11	.02	.02	.22	.03	.04	.01	.01	-.06
RSSR Activity	57	.22	.05	-.01	.04	-.02	.21	.13	-.09	-.07

Table 90 (Continued)

Measure	10	11	12	13	14	15	16	17	18	19	20	21
1												
2												
3												
4												
5												
6												
7												
8												
9												
10	--											
11	.02	--										
12	.42	-.09	--									
13	-.17	.03	-.16	--								
14	.32	-.09	.57	-.14	--							
15	.14	-.38	.04	-.26	.09	--						
16	.45	-.18	.72	-.25	.86	.14	--					
17	.23	.04	-.13	.21	-.28	.02	-.06	--				
18	.16	.16	.06	-.28	.14	.19	.23	.28	--			
19	-.05	-.05	-.12	-.06	.12	.32	.04	.28	.40	--		
20	.05	.06	-.19	.02	.02	.13	.03	.46	.57	.70	--	
21	-.01	.05	-.25	.09	-.31	.04	-.19	.61	.32	.49	.51	--
22	-.22	.17	-.21	.32	-.22	-.18	-.21	.47	.22	.26	.38	.44
23	.14	-.03	.07	-.24	.27	.26	.30	.11	.74	.35	.34	.01
24	-.00	-.03	.11	-.28	.26	-.04	.21	-.45	-.12	-.25	-.25	.24
25	.06	.22	.07	.29	.27	-.24	.11	-.43	.10	-.20	-.16	.36
26	.10	-.05	.37	-.12	.31	.05	.27	-.51	-.28	-.49	-.57	.54
27	-.11	.11	-.02	-.04	-.34	-.13	-.24	.05	-.21	-.13	-.10	.31
28	-.11	-.17	-.12	.23	.00	-.12	-.16	-.31	-.86	-.29	-.52	-.45
29	-.15	-.16	-.15	.20	-.16	-.13	-.26	-.24	-.94	-.36	-.55	-.32
30	.04	.08	.40	-.19	.27	.04	.16	-.42	-.05	.07	.02	-.20

Table 90 (Continued)

Measure	10	11	12	13	14	15	16	17	18	19	20	21
31	-.10	.20	-.13	.23	-.41	-.31	-.30	.27	-.23	-.20	-.08	.28
32	-.18	-.19	-.28	.24	-.02	-.10	-.18	-.05	-.72	-.06	-.27	-.22
33	-.12	-.21	-.19	.13	.17	.06	-.02	-.14	-.44	.06	-.13	-.33
34	-.04	-.34	.38	-.26	.27	.45	.30	-.39	.18	.01	-.08	-.24
35	-.13	-.14	.21	.13	.04	.19	-.02	-.37	-.36	-.24	-.38	-.36
36	-.06	-.31	.35	-.25	.22	.47	.25	-.35	.15	.04	-.03	-.16
37	-.23	-.02	.05	.01	-.06	.19	-.12	-.25	-.19	-.12	-.20	-.24
38	.04	-.13	.13	-.36	.26	.15	.26	-.47	-.13	-.22	-.20	-.16
39	.03	.20	.07	-.27	.28	-.24	.10	-.47	.09	-.21	-.14	-.35
40	.15	.03	-.05	-.15	.29	.17	.29	.22	.66	.27	.30	-.03
41	.11	-.25	.13	.12	.09	-.04	.17	.21	-.05	.03	.09	-.01
42	-.01	-.07	.12	.13	.01	-.08	.04	.09	-.02	-.01	-.05	-.13
43	-.02	-.37	-.01	.14	-.06	.17	.02	.15	-.01	.02	.07	-.09
44	.04	-.22	.02	.24	-.12	-.15	-.07	.24	-.13	.00	.11	-.01
45	-.01	-.36	-.03	.22	-.14	-.01	-.08	.21	-.07	-.00	.10	-.02
46	.11	.05	-.29	-.02	-.19	.05	-.18	.26	.07	-.07	.10	.22
47	.02	.17	.12	.13	.08	-.21	.02	-.20	-.23	-.28	-.30	-.14
48	.08	.01	.19	-.05	.02	.11	.01	-.20	-.17	-.10	-.22	-.14
49	.12	-.02	-.31	.00	-.08	.14	-.19	.20	.25	.24	.25	.15
50	-.15	.29	-.32	.06	-.25	-.01	-.36	.20	.18	.21	.35	.15
51	-.17	-.15	-.08	.22	-.15	-.13	.00	.18	-.14	-.09	-.01	.03
52	.14	-.14	.10	.23	.04	-.09	-.01	-.03	-.19	-.19	.02	-.21
53	.02	-.01	.12	-.05	-.19	.28	-.15	-.13	-.11	-.22	-.21	.04
54	-.06	-.00	-.18	-.16	.09	.01	-.01	.03	.16	.14	.22	.02
55	-.15	.04	-.29	-.04	-.25	.09	-.24	.30	.20	.21	.29	.30
56	-.01	-.10	-.13	.15	-.08	.10	-.07	.25	-.04	.00	.09	.07
57	-.29	-.18	-.16	.13	.09	.16	-.03	-.04	-.05	-.01	-.03	-.24

Table 90 (Continued)

Measure	22	23	24	25	26	27	28	29	30	31	32	33
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22	--											
23	.00	--										
24	-.24	-.08	--									
25	-.03	.01	.28	--								
26	-.47	-.25	.15	.29	--							
27	.04	-.54	.09	-.26	-.13	--						
28	-.29	-.45	.07	-.05	.26	-.22	--					
29	-.23	-.68	.11	-.11	.20	.13	.90	--				
30	-.12	-.15	.15	.33	.46	.05	-.16	-.16	--			

Table 90 (Continued)

Measure	22	23	24	25	26	27	28	29	30	31	32	33
31	.21	-.54	-.06	-.24	-.24	.75	-.10	.19	-.29	--		
32	-.00	-.32	.01	-.11	-.08	-.23	.88	.81	-.41	-.06	--	
33	-.09	.04	.03	.01	-.01	-.60	.77	.55	-.24	-.52	.85	--
34	-.27	.31	.07	.12	.36	-.13	-.19	-.25	.48	-.50	-.33	-.06
35	-.16	-.21	.02	.04	.59	-.17	.35	.27	.44	-.33	.06	.19
36	-.19	.24	.04	.10	.31	.08	-.18	-.21	.51	-.49	-.30	-.05
37	-.10	-.06	.02	.08	.26	-.16	.19	.14	.28	.39	.05	.22
38	-.27	-.12	.53	.24	.19	.21	.03	.07	.28	-.15	-.09	-.04
39	-.08	-.02	.23	.98	.36	-.25	-.04	-.11	.39	-.29	-.14	.01
40	.01	.92	-.03	.05	-.26	-.61	-.32	-.56	-.30	-.48	-.17	.15
41	.15	.07	-.02	.01	-.05	-.32	.17	.10	-.01	-.23	.20	.27
42	.19	.11	-.08	.03	-.10	-.34	.19	.09	-.13	-.11	.24	.29
43	.15	.19	-.14	.07	-.00	-.52	.18	.04	-.07	-.30	.21	.36
44	.09	-.14	-.20	-.01	-.15	-.22	.20	.14	-.11	.03	.24	.21
45	.17	.00	-.22	.03	-.09	-.36	.19	.10	-.14	-.10	.24	.29
46	.03	.01	-.27	-.09	-.09	.09	-.10	-.01	-.21	.11	-.03	-.04
47	-.15	-.19	.02	.06	.31	.27	.10	.14	-.03	.15	.03	-.04
48	-.15	-.14	.17	-.09	.00	.22	.11	.14	-.02	.20	.05	-.05
49	.31	.25	-.16	.02	-.30	-.17	-.14	-.22	-.16	-.12	-.01	.06
50	.16	.03	-.20	.06	-.34	.07	-.14	-.10	-.21	.13	-.03	-.05
51	.18	-.03	.07	-.16	-.28	-.07	.24	.19	-.36	.10	.32	.23
52	-.07	-.02	.01	-.05	-.02	-.09	.24	.18	-.12	-.03	.17	.17
53	-.06	-.31	.12	-.06	.16	.37	-.09	.08	.23	.18	-.20	-.30
54	-.09	.15	-.07	.17	.06	-.12	-.15	-.16	.12	-.18	-.11	-.00
55	.23	.11	-.04	-.09	-.33	.10	-.18	-.14	-.15	.05	.00	.00
56	-.03	-.01	-.06	-.03	-.09	-.09	.00	.02	-.15	.11	.02	-.01
57	-.01	.10	-.04	-.18	-.01	-.05	.09	.08	-.20	.05	.14	.12

Table 90 (Continued)

Variable	34	35	36	37	38	39	40	41	42	43	44	45
31												
32												
33												
34	--											
35	.43	--										
36	.97	.46	--									
37	.32	.78	.38	--								
38	.35	.20	.41	.16	--							
39	.17	.13	.16	.16	.29	--						
40	.07	-.27	.00	-.10	-.15	.01	--					
41	.09	.17	.06	.14	-.09	-.05	.06	--				
42	-.01	.11	-.05	.12	-.26	-.03	.11	.44	--			
43	.25	.30	.22	.22	-.18	.05	.18	.57	.44	--		
44	-.13	.05	-.13	.14	-.37	-.03	-.11	.46	.68	.48	--	
45	.06	.14	.03	.17	-.37	.00	.00	.55	.64	.80	.87	--
46	-.13	-.24	-.12	-.15	-.22	-.08	.03	-.28	-.34	-.11	-.27	-.19
47	-.01	.14	-.02	.12	.06	.11	-.19	-.40	-.09	-.28	-.18	-.18
48	.02	-.05	-.02	-.07	.14	-.13	-.22	-.01	.25	-.28	.12	-.04
49	-.05	-.14	-.07	-.04	-.20	.00	.20	.01	.02	-.00	-.06	-.03
50	-.22	-.27	-.21	-.03	-.23	.06	.06	-.07	-.17	-.26	-.07	-.19
51	-.18	-.08	-.15	-.01	.03	-.22	.01	.33	.21	.26	.29	.24
52	.07	.13	.05	.08	-.02	-.03	-.05	.49	.19	.24	.22	.24
53	.19	.13	.21	.08	.16	-.02	-.44	-.04	.00	-.21	.03	-.08
54	-.01	-.05	-.02	.09	-.19	.21	.20	-.10	-.34	-.05	-.24	-.15
55	-.08	-.09	-.03	.01	-.15	-.10	.12	-.05	-.08	.02	-.08	-.05
56	-.21	-.04	-.17	.03	-.09	-.03	.10	-.07	-.08	-.02	-.09	-.14
57	-.09	-.07	-.10	-.09	-.00	-.19	.18	-.15	-.12	-.12	-.23	-.22

Table 90 (Continued)

Measure	46	47	48	49	50	51	52	53	54	55	56	57
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46	--											
47	.05	--										
48	-.41	.06	--									
49	.33	-.26	-.08	--								
50	.25	-.22	.14	.43	--							
51	-.02	-.11	-.07	-.02	.04	--						
52	-.16	-.00	.09	.11	.13	.17	--					
53	-.09	-.05	.42	-.02	.07	-.17	.09	--				
54	.38	.01	-.51	.22	.08	-.34	-.08	-.38	--			
55	.31	-.00	-.21	.19	.22	.21	-.09	-.22	.22	--		
56	.34	-.17	-.18	.23	.18	.12	.02	-.15	.34	.11	--	
57	.03	.06	.05	.07	.01	.09	-.04	-.20	.17	-.05	.36	--

Table 91

Rotated Factor Loadings for Process and Product Measures*

		Factor												
	Measure	1	2	3	4	5	6	7	8	9	10	11	12	h^2
1	T Enc Int Gen						-84**							77
2	P Int Att Rating	-38					-30	-59						80
3	T V H				36	26	25	40					48	77
4	P V H						-33	72						81
5	P Non-V H							86						79
6	T Non-V A	-29		-28			-31	-36		-55				77
7	P V A						-69		-25					68
8	F M	65	-26					28	-29					78
9	T A G	75												83
10	T A/S A		-61	-70										93
11	SS 3-3			-72			26							70
12	Ext Ind			-26	-70					-25				79
13	SS 5-5			-80					-26					81
14	SS 7-7					26							80	84
15	V C					94								91
16	Tot/10	39		50		38			-37					84
17	S Talk ff TT		-45	47		-35	25				-27	33		90
18	S Talk Prolong		87	42										96
19	Drill		-39	47		-34			59					87
20	Inquiry		90											95
21	Inq/Dr Ratio		94											96
22	Pupil Interest								-92					91
23	P Ini ff T Ind								-91					88
24	Rev Dis					95								93
25	Vocabulary							-33		-49		-53		75
26	Reading			27								-84		83
27	Arith Concepts		25		-29		-31	-32	-27			-55		77
28	Arith Prob											-76		74
29	Anxiety	-39			-69									77
30	L			25				59			-36	25		73
31	D-P				87									83
32	Creativity N-V	-62					25				36			69
33	Creativity P I	-67								-30				71
34	Creativity U U					-33	-29					-34	44	65
35	Pupil Survey									-85				82
36	Halo	-26	-32	43	44				-29					66
37	Disorder				-60	28	22				25	30		70
38	RSSR Tot				-29						75			71
39	RSSR Act										59	35		64

*N = 55

**Decimals and values less than ±.25 are omitted.